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School of Business

THE ROLE OF VALUATION IN EQUITY CROWDFUNDING

Master's Thesis
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Abstract of master's thesis

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Abstract

The subject of this Master of Science thesis is valuation in the context of equity crowdfunding. This includes both the formation of valuation by the entrepreneurs or the company in preparation for an equity crowdfunding campaign and the implications that valuation and the valuation multiples derived from it have for the success of the equity crowdfunding campaign. The dataset used for the present study from Invesdor Oy consists of 103 equity crowdfunding campaigns conducted through the Invesdor.com platform between May 2012 and January 2016. The subset used for the valuation multiple study consisted of 55 campaigns for which the required EBITDA and Sales forecasts as well as Balance Sheet data for the calculation of Enterprise Value, were available. A separate subset of the data was selected for which telephone interviews were conducted to shed light on the basis for the valuation decision.

This study establishes that the forecast values of Enterprise Value/EBITDA (EV/EBITDA) and Enterprise Value /Sales (EV/S) can be used in predicting the extent of campaign success in equity crowdfunding. The correlations that were found are generally positive, which was initially counterintuitive as high valuation multiples are typically a sign of overvaluation. The proposed explanation for this is the investors' preference for more realistic (and thus maybe lower) EBITDA and Sales forecasts leading to higher valuation multiples for a given enterprise value. An unexpected result of the present study was that the stage or the industry of the company having the crowdfunding campaign does not significantly add to the valuation multiples as a predictor of campaign success.

The limitations of these correlations are also recognized as the explanatory value of the valuation multiples are not high and subsequently, the standard errors are considerable.

Several factors were proposed on which the companies preparing for an equity crowdfunding campaign base their valuation decisions. The proposed factors of (i) expected profits, (ii) estimate sunk/project cost, and (iii) benchmarking were all found to have been used to varying degree and differences between industries in their valuation decision making were found

Keywords Crowdfunding, Equity crowdfunding, Valuation, Valuation multiples, EV/EBITDA, EV/Sales

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Tiivistelmä

Tämän kauppatieteiden maisterin opinnäytetyön aiheena on yrityksen arvostus osake- eli pääomapohjaisen joukkorahoituksessa. Tässä työssä käsitellään niin arvostuksen muodostusta valmisteltaessa osakepohjaista joukkorahoituskampanjaa, kuin arvostuksen ja siitä seuraavien arvostuskertoimien, eli yritysarvo/käyttökate (EV/EBITDA) ja yritysarvo/myynti (EV/S) suhdelukujen vaikutusta osakepohjaisen joukkorahoituksen kampanjan onnistumisen kannalta. Tutkimuksessa käytetty aineisto koostuu 103:sta Invesdor.com -joukkorahoitusalustalla toukokuun 2012 ja tammikuun 2016 välisenä aikana toteutetusta kampanjasta. Arvostuskerroin osiossa käytetty aineisto koostui 55 kampanjasta, joiden osalta oli saatavilla vaaditut käyttökate- ja myynti ennusteet sekä tasetiedot yritysarvon (enterprise value) laskemiseksi. Arvostuksen muodostuspäätöksen selvittämiseksi valittiin erillinen joukko, jonka pohjalta suoritettiin lisäksi sarja puhelinhaastatteluja.

Tässä tutkimuksessa todetaan, että ennustepohjaisten yritysarvo/käyttökate (EV/EBITDA) ja yritysarvo/myynti (EV/S) arvostuskertoimia voidaan käyttää ennustamaan osakepohjaista joukkorahoituskampanjan menestystä. Korrelaatiot, jotka löydettiin ovat pääasiassa positiivisia, mikä oli tuloksena aluksi epäintuitiivinen. Tyypillisesti korkea arvostuskerroin on merkki yliarvostuksesta. Ehdotettu selitys tälle on se, että sijoittajat pitävät parempana realistisempia (ja siten ehkä pienempiä) käyttökate- ja myyntiennusteita, mikä johtaa korkeampiin arvostuskertoimiin tietyllä yritysarvolla. Yhtenä tämän tutkimuksen tuloksena oli yllättäen, ettei joukkorahoituskampanjoiden yritysten toimiala anna merkittävästi lisäarvoa arvostuskertoimiin verrattuna kampanjan onnistumisen ennustajana.

Näiden korrelaatioiden rajoitukset myös tunnistetaan sillä luodut mallit ja erityisesti arvostuskertoimet selittävät vain rajallisen osan kampanjoiden onnistumisesta keskivirheen ollessa merkittävä.

Tämän tutkimuksen perusteella osakepohjaisten joukkorahoituskampanjoiden arvostuksen muodostuspäätös pohjautuu seuraaviin tekijöihin: (i) odotettavissa olevat voitot, (ii) arvioidut uponneet-/projekti kustannukset ja (iii) vertailuanalyysi. Näiden tekijöiden havaittiin olleen käytössä vaihtelevasti ja eri toimialojen välillä havaittiin vallitsevan eroja siinä, miten näitä tekijöitä painotetaan arvostuksenmuodostusta tehtäessä.

Avainsanat joukkorahoitus, osakepohjainen joukkorahoitus, pääomapohjainen joukkorahoitus, arvonmääritys, arvostuskertoimet, EV/EBITDA, EV/Sales

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Also, the role my wife and children have played in making my present studies possible should not be left unacknowledged and for this, I am eternally indebted.

This 's Thesis was completed in several phases starting in spring 2016, but finally being completed during the fall of 2018. During this time, the scope of the thesis went from a bachelor's thesis to a master's thesis as the amount of work accumulated. Never the less, this clearly drawn out schedule is the results of the combined effects of both *planning fallacy* (Buehler et al., 1994) and *optimism bias* (Buehler and Griffin, 2003). For this, I would like to extend my sincere apologies both to the co-operation partners and faculty as well as especially to my family for all inconveniences caused by the delay.

Helsinki, 20th of March 2019

Tuomas Noopila

Contents

List of Abbreviations and Symbols

BA	Business Angel
CAPM	Capital Asset Pricing Model
CF	Crowdfunding
CROWDFUND	Capital Raising Online While Deterring Fraud and Unethical Non-Disclosure Act
DCF	Discounted Cash Flow
DDM	Dividend Discount Model
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EEA	European Economic Area
EV	Enterprise Value
FiBAN	Finnish Business Angel Network
ICT	Information and Communications Technology
IPO	Initial Public Offering
JOBS	Jumpstart Our Business Startups Act
MiFID	Markets in Financial Instruments Directive
MVM	Multiples Valuation Method
OLS	Ordinary Least Squares
P/E	Price to Earnings
RIM	Residual Income Model
SEC	Securities and Exchange Commission
VC	Venture Capital
WACC	Weighted Average Cost of Capital

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1. INTRODUCTION

This introductory chapter describes the background of this study into the different aspects of valuation as well as the research questions and the hypotheses for the study.

1.1 Background

Crowdfunding has been defined as the collective process of capital gathering, or people pooling their money or other resources together, usually via the internet with the help of social media outlets to support the efforts of others (Kitchens & Torrence, 2012). During the past decade crowdfunding has emerged as a method of funding start-ups or other new business ventures, projects, and initiatives by collecting contributions (often small, but sometimes larger) from a large number of people i.e. the crowd. This is usually carried out through an online platform. Therefore, Web 2.0 has been central to the development of crowdfunding. The crowdfunding platforms and social media enable companies to connect with a large number of potential funders easily and efficiently.

Crowdfunding exists in several forms, one of which is equity crowdfunding. The different forms of crowdfunding are described in figure 1. In reward-based or donation-based crowdfunding, the contributors or funders may be rewarded for participating by small token rewards which are typically of no great value. In loan-based crowdfunding, the contributions are handled like loans which are paid back with interest in a normal manner.

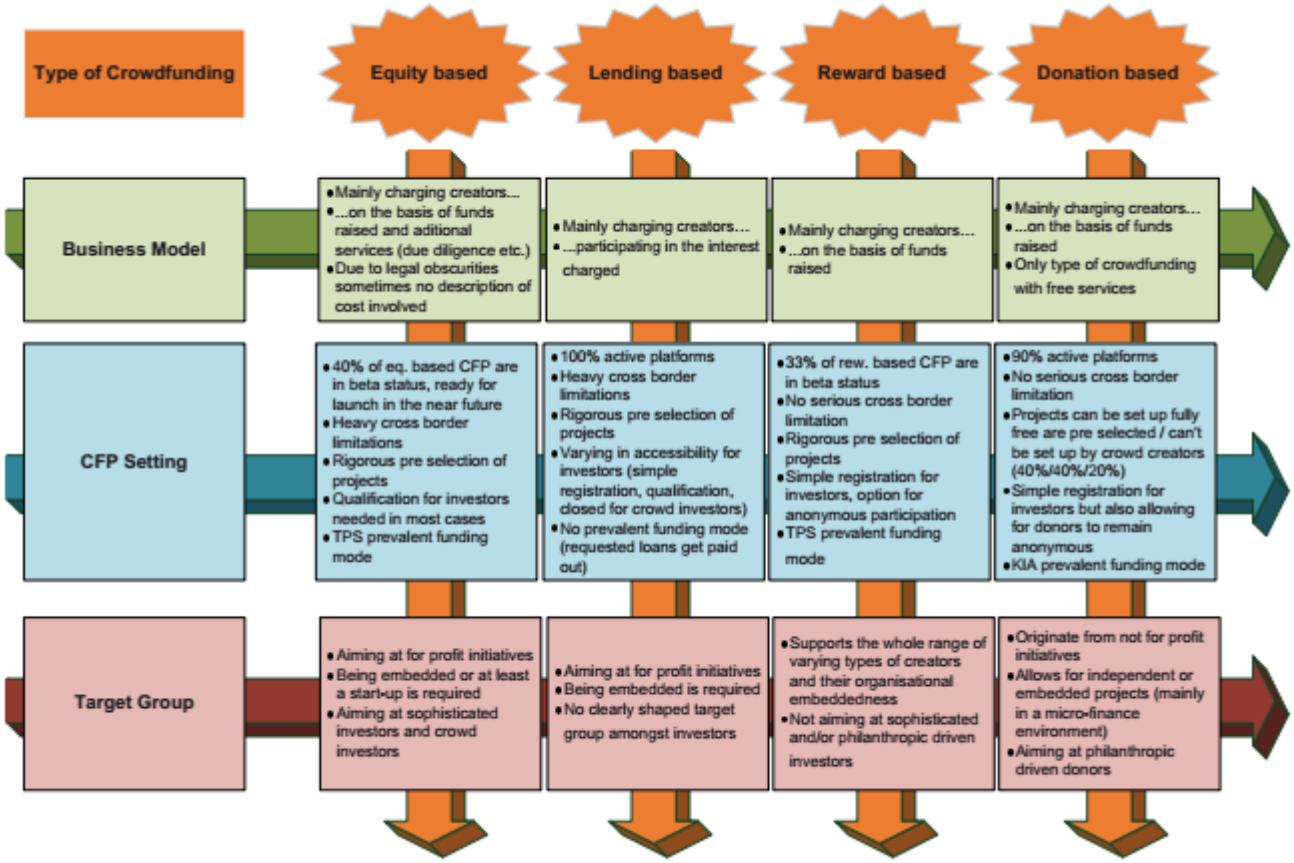

Figure 1. Stereotypical crowdfunding platforms (Danmayr, 2014, p. 97)

In equity crowdfunding, the investors are rewarded with shares in the company (typically unlisted companies) in exchange for their contribution to the crowdfunding campaign and they carry the risks and rewards like any other owners of equity. This equity risk involved clearly separates equity crowdfunding from loan-based crowdfunding. In this way, equity crowdfunding has much in common with venture capital or angel investing. Equity crowdfunding is also referred to as investment-based crowdfunding, securities-based crowdfunding or crowdinvesting (Hornuf and Neuenkirch, 2017). The stages through which the crowdfunding process proceeds are described in figure 2.

Equity crowdfunding has been a fast-growing field in Europe as well as in Asia. In the USA, investing in equity crowdfunding has become available to the general public only fairly recently. On October 30, 2015, the Securities and Exchange Commission (SEC) adopted the final rules to permit companies to offer and sell securities through crowdfunding in the form of Title III (the 'Capital Raising Online While Deterring Fraud and Unethical Non-Disclosure Act of 2012,' or CROWDFUND Act) of the

Jumpstart Our Business Startups (JOBS) Act. The JOBS Act went fully into effect on May 16, 2016. Under the crowdfunding exemption, entrepreneurs and small business owners may raise a maximum of $1m per 12-month period without registering the Sales with the SEC. As for the investors, they may invest $2 000 or at maximum 5% of their annual income or net worth, if it is under $100 000, or up to 10% of their annual income or net worth if it is over $100 000. This growth in the equity crowdfunding markets has thus fairly recently led to equity crowdfunding becoming an increasingly relevant topic in academic research in the international context. This is especially true since the requirements for both the funders and the firms seeking funding are different from more traditional financing (Stemler, 2013).

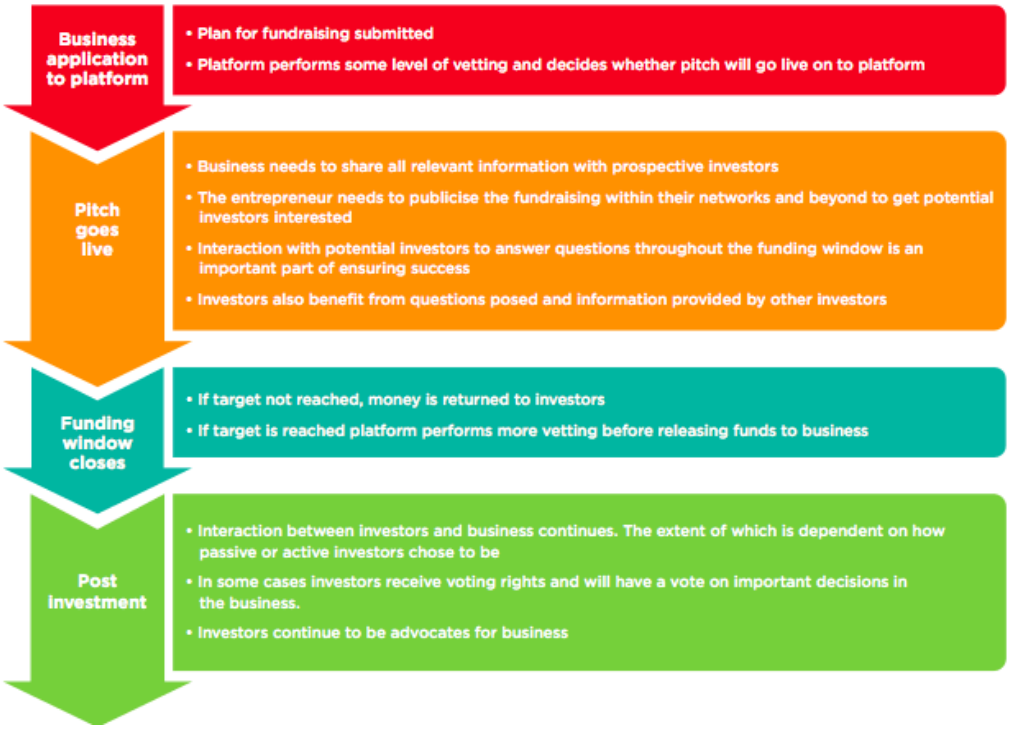

Figure 2. The stages of the equity crowdfunding process (Collins and Pierrakis, 2012).

While many forms of legal restrictions still apply to equity crowdfunding in many countries, in Finland, the legislation has allowed equity crowdfunding for some time and new legislation clarifying the regulations came into effect in September 2016 (Ministry of Finance, 2016a) with further clarifications issued by a Ministry of Finance decree on December 8th, 2016 (Ministry of Finance, 2016b).

Due to the lack of legal restrictions, the crowdfunding market in Finland is growing steadily as it more than doubled in size in 2016 according to a

survey by the Ministry of Finance (2016 c) and grew by over 50% in 2017 according to Bank of Finland (2018). In 2014 the total amount of crowdfunding collected was 52 M€, in 2015 it grew to 70.5 M€, in 2016 to 153 M€ and in 2017 to 246.7 M€. This represents the total amount of crowdfunding. The equity crowdfunding market in 2016 was €41.8m with a year-on-year increase of 188% and in 2018 the market was 63.0 M€ with a year-on-year increase of 51% (Bank of Finland, 2018). Overall, during 2012–17 the market has grown on average 144% per year (Herrala, 2018a). The total development of the Finnish crowdfunding market is described in Table 1.

Table 1. Amounts of funding collected or mediated in Finland through different forms of crowdfunding (Bank of Finland, 2018; Ministry of Finance, 2016c).

	2014	2015	2016	2017
Loan-based crowdfunding	13.3 M€	20.8 M€ (+56%)	46.3 M€ (+123%)	75.8 M€ (+64%)
Investment-based crowdfunding	8.66 M€	14.5 M€ (+68%)	41.8 M€ (+188%)	63.0 M€ (+51%)
Peer-to-peer lending	29.7 M€	34.6 M€ (+16%)	64.2 M€ (+86%)	106.8 M€ (+67%)
Reward-based crowdfunding	364 k€	640 k€ (+75%)	960 k€ (+50%)	1 000 k€ (+5%)
Total	52 M€	70.5 M€ (+36%)	153.2 M€ (+117%)	246.7 M€ (+61%)

The European equity crowdfunding market as a whole is also growing fast and Europe has been the leader in this field because of the head start made possible by less restrictive legislation (Wilson and Testoni, 2014). Fast growth is also true in Asia; in Hong Kong, Singapore, Japan, Korea, and Southeast Asia (McLaughlin, 2016) as well as China (Funk, 2016). Many crowdfunding platforms, like Invesdor.com – the case company of the present study, also operate in several countries with both domestic and foreign customers, both investors and investees.

The Invesdor.com portal has been in operation since 2012. Invesdor Oy was the first in the European equity crowdfunding field to hold a MiFID-level (Markets in Financial Instruments Directive) investment services license to operate across the European Economic Area (EEA). Invesdor has also been one of the leading equity crowdfunding platforms in Finland (Lasrado and Lugmayr, 2014). Recently, Invesdor has also expanded into loan-based crowdfunding (or crowdlending), but this is outside the scope of the present study. Thus, Invesdor presents a unique opportunity to

study a business model, which has not been previously studied extensively and which is still more or less in its formative phase.

As discussed above, equity crowdfunding is a relatively new form of funding available for e.g. start-ups and clearly different from a traditional business angel, venture capital or institutional investors. Therefore, the companies planning an equity crowdfunding campaign should also take into consideration that the investors they are likely to attract are different and present their own types of challenges. Even with the efficient communication platform presented by for example the crowdfunding platform, substantial time and resources may be required for attracting and later administrating and communicating with that type of shareholder base (Kitchens and Torrence, 2012).

1.2 Introduction to Equity Crowdfunding Research

Equity crowdfunding has been thus far internationally a less common form of crowdfunding compared to reward- or donation-based crowdfunding and crowdfunding, in general, is also a quite recent phenomenon. Therefore, even with the recent growth in academic interest and the subsequent number of recent publications, there are many aspects of equity crowdfunding that have not been studied in detail, if at all. The underlying dynamics of investor decision making and subsequent success and failure among crowdfunded ventures have been studied by Mollick (2014). His conclusion was that the success of crowdfunding campaigns appears to be linked with project quality as well as active online social networks of the persons seeking crowdfunding. Whereas Mollick (2014) relied on a large dataset and statistical examination, Burtch et al. (2013) studied the contribution patterns of crowd-funded online journalism projects on a more detailed level concentrating on the quality of the campaign pitch as well as the amount and timing of others' contribution. Frydrych et al. (2014) used a subset of the dataset used by Mollick (2014) to study how project characteristics such as lower funding targets or shorter campaign duration demonstrate legitimacy which leads to success. While interesting and relevant, none of the studies concentrated on equity crowdfunding especially, so they need to be considered in that light.

Belleflamme et al. (2014) and Sahm et al. (2014) studied crowdfunding from an economic theory point of view and how the amount of funds needed to be raised affects the individual rationality of the funders in either reward-based or profit sharing form of crowdfunding. They note that crowdfunding allows for price discrimination and thus stress that to make crowdfunding viable the focus must be on the private benefits the participants enjoy from it and the need to build a community to support that.

Belleflamme et al. (2013) on the other hand compared both equity and reward-based crowdfunding campaigns and found somewhat surprisingly, that non-profit organizations had the highest rates of success. It appears that the crowd puts more trust into non-profit organizations due to their lack of profit incentive i.e. the perceived agency issues are smaller. Belleflamme et al. (2013) also find that reward-based crowdfunding campaigns aimed at making a product have a tendency to attract larger amounts of capital than those offering a service. The required amount of funding may naturally have affected this result, but a tangible outcome may also be preferred by funders. Less surprising was the evidence Ahlers et al. (2015) found that the most important drivers for equity crowdfunding success are the credibility of signals, the perceived quality of the start-up in question, and the apparent accuracy of information disclosure. Thus, we can conclude that the success drivers for the crowdfunding campaigns, i.e. funder decision making rationales are either social and connected either to the social or the economic worthiness of the campaign as perceived by the funders.

Equity crowdfunding campaigns carried out on the Invesdor.com portal have been studied by Lukkarinen et al. (2016). Their results were consistent with the findings from studies on non-equity and equity crowdfunding campaigns in that the most important drivers for success were private networks, social media networks and the size of the minimum allowed investment. The availability of financial information as part of the campaign pitch was also found important. This is especially interesting for the present study as one part of the study is directly concerned with how the potential investors process this kind of financial in-

formation and may valuation multiples be interpreted as viable indicators of financial quality. Markets, concept, scalability, stage, or deal terms were not found to be significant predictors of campaign success.

In the discussion part of Lukkarinen et al. (2016), it is pointed out that one of the topics for a further study they have recognized is valuation. The issue of valuation of a start-up company is both difficult and important. Valuation methods based on discounted cash flow (DCF) models are difficult to apply as the companies seeking funding are at a very early stage and the cash flows are difficult to predict accurately. Relative methods based on multiples are not without problems either.

The valuation of the company has a direct impact on how large a share an investor is entitled to in return for their investment. As there is no formal market mechanism for verifying the validity of the valuation of the company made by the entrepreneurs (with outside experts and the platform assisting), it is the crowdfunding campaign in which the funders either reject this as too high or accept it as valid enabling the campaign to succeed.

This value (prior to the funding round in question) is called the pre-money valuation. If company net debt is known, the enterprise value (EV) can be calculated, by adding the net debt to the pre-money valuation. The valuation multiples EV/EBITDA and EV/Sales can be calculated if EBITDA and Sales are known or can be forecast. These multiples (based on actual values, not forecasts) are widely used in the finance industry to make a valuation for a company or to measure the validity of a valuation of a company e.g. at the IPO stage. Their popularity arises from the fact that they are capital structure-neutral (e.g. Harbula, 2009). Other valuation multiples exist but comparing enterprise value to EBITDA or Sales is from the theoretical perspective the best option. For the present study, EBITDA and Sales forecasts were available, and they are, in general, relatively easy to estimate, and they do not require the company to estimate its loan interest-related expenses which would be needed if equity value-based multiples e.g. Price/Earnings would be used.

Valuation multiples are typically used for benchmarking valuations, but they are highly specific to a certain industry and situation of the company, hence the need to have closely matching companies used for comparison

(Chastenet and Marion, 2015). In the case of start-ups or similar companies and projects, cash flow, EBITDA and Sales figures used may not exist or they are not representative of those expected even in the medium term. Therefore, the projected numbers may be used. Naturally, this is the case for established companies as well since the whole idea is to predict future earnings, but in the case of start-ups, the uncertainty is considerably higher (Damodaran, 2009). Many companies on the Invesdor.com portal provide sufficient financial information and projections which makes it possible to calculate the projected EV/EBITDA and EV/Sales multiples for some years into the future from the start of the crowdfunding campaign.

1.3 Research Questions for the Present Study

The first research question for this study is: Do the EV/EBITDA and EV/Sales multiples correlate with campaign success? This is interesting *per se,* but the result may also implicitly reveal something of the type of investors who take part in the funding of the campaigns and how they assess the campaign proposals (possibly also how the EBITDA and Sales forecasts have been formed). However, the secondary, but ultimately more important reason for finding out if and how the valuation multiples correlate with campaign success is to find out if the aforementioned valuation multiples as viable as a simple figure or metric to indicate crowdfunding campaign quality in the same way as P/E figures are used for publicly traded stocks and the EV/EBITDA and EV/Sales multiples in other finance contexts e.g. IPOs. The use of valuation multiples to valuate equity is well documented and it has an established position in the finance industry. This may be of interest for both the investors as well as the firms seeking funding. For the investors, it is relevant in assessing campaign and company quality and for the companies in assessing their valuation in relation to their EBITDA and Sales forecasts (and hopefully not the other way around). This question arose from direct discussions with the representatives of the Invesdor equity crowdfunding platform due to the finding of Lukkarinen et al. (2016) that the availability of financial information as part of the campaign pitch was found to positively affect campaign success and Invesdor's desire to develop and improve the

type of financial information available for the potential investors as part of the campaign pitches.

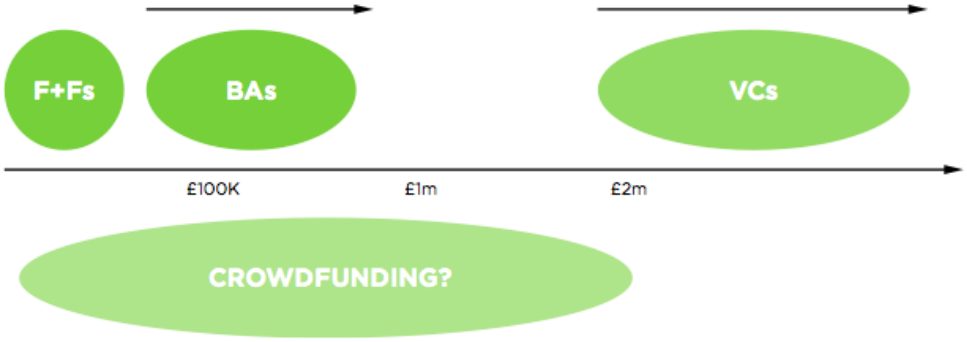

Figure 3. The position of crowdfunding in relation to business angels and venture capital (Collins and Pierrakis, 2012).

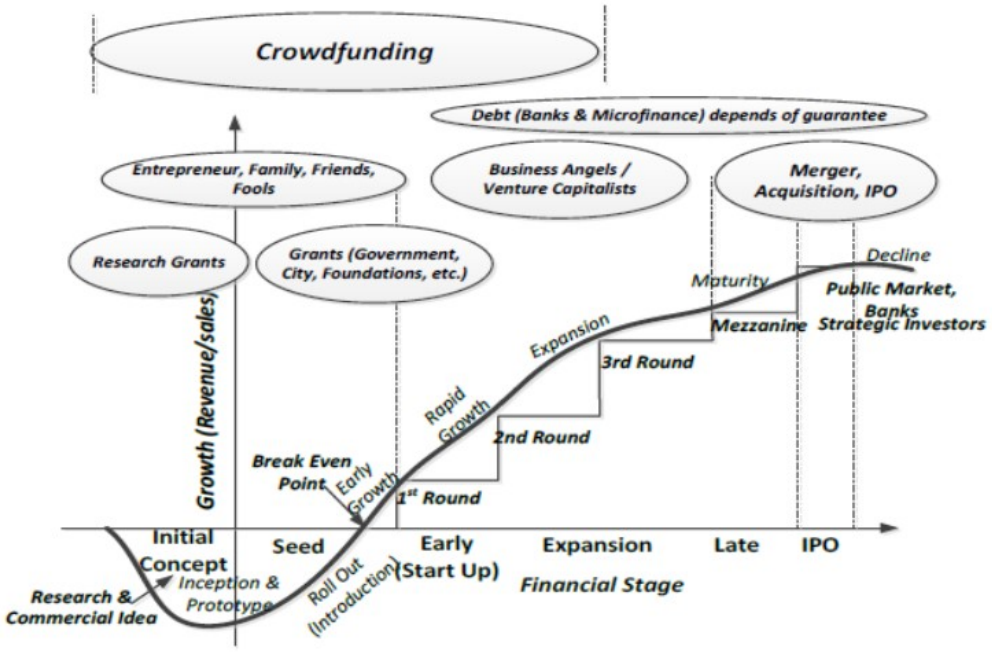

Figure 4. Financing cycle of a venture (Rossi, 2014).

The lack of collateral and the increased risk connected with the early stage of the business often makes it difficult for start-ups to attract traditional debt financing. Typically, the initial investments are made by the founders, and their friends and family. Since friends and family often do not have sufficient funds available for the start-ups and banks are not willing to provide debt funding, other sources of risk capital are needed (Brown et al., 2015). Traditionally they have been business angels and venture capitalists but more recently also crowdfunding (Mollick, 2014) as an alternative or additional means of funding, as shown in figure 3 and figure 4. A shift in the projects funded by business angels and venture

capitalists depicted in figure 3 has been noticed (Collins and Pierrakis, 2012; Ley and Weaven, 2011) creating a so-called funding gap for which crowdfunding, equity or otherwise based, could be a potential solution.

Belleflamme et al. (2010), Belleflamme et al. (2013), Belleflamme and Lambert (2014) and Mollick (2014) discuss the entrepreneurs' motivations to seek funding through crowdfunding and note that it does not entail only funding. Information available from the campaign is also important. It may be equally important for the company seeking funding to obtain feedback on the product or service or to generate publicity (towards potential customers as well as other forms of financing) since equity crowdfunding is seldom used as the only source of funding. Based on research by Belleflamme et al. (2013) public attention was relevant for over 85%, and feedback on the product or service offered was relevant for about 60% of the campaigns. Crowdfunding is thus connected to in a way to crowdsourcing of information. An equity crowdfunding campaign may also be a way to estimate the market value of the company.

The enterprise value and the pre-money valuation it is based on are therefore also extremely important for these multiples to be useful and therefore it is important to consider how that valuation was formulated and by whom. The valuations are usually made by the companies themselves (especially during the period considered in the present study – since then the role of third-party experts has grown), but it is worthwhile to consider which factors were determinant in the process and who exactly did partake in it. Was the valuation entirely based on internal estimates or were outside experts or knowledge used and to what extent?

Ultimately, the success of the equity crowdfunding campaign can be seen as a test of how well the crowd agrees with the valuation that has been made. Undervalued companies should see their campaigns reach or exceed the funding target very fast while overvalued companies will fail to reach their funding targets.

The second research question in this study is: What factors determine the company valuation on selected campaigns, and can differences be found between different sectors or company types? There are numerous studies where crowdfunding investor behaviour and their sophistication is analysed. In the present study, the aim is more to study how companies

seeking funding through equity crowdfunding form their valuation decision, and how rationally these companies behave during the valuation phase of their campaign preparation.

As far as the literature survey has shown similar analysis has not been carried out on projected EV/EBITDA and EV/Sales multiples and their usefulness in predicting the success of equity crowdfunding campaigns. The aim of this research is to carry out analysis of data available from the Invesdor.com portal which is, in essence, an extended version of the same sample used by Lukkarinen et al. (2016). This also enables a comparison of the results.

For research question 2, a survey consisting of telephone interviews of the persons involved in a selected group of crowdfunding campaigns from the dataset discussed above was also conducted to gain a better understanding of the factors which affect the pre-money valuations of the companies. Issues of interest were whether the valuation was formed entirely inside the company and how this valuation was influenced by other forms of financing used before or planned to be used after the crowdfunding campaign. Thus, the aim of the survey part of the thesis was to study valuation from the company's perspective and to see whether it influences valuation and subsequently the success of the crowdfunding campaign.

1.4 Structure of the Thesis

This master's thesis is structured in the following way. The introduction is located in chapter one, where the research topic is outlined and placed in context within the larger field of crowdfunding. The concepts of enterprise value and valuation multiples are introduced, and the research questions are presented. After these, the literature review is placed in chapters two and three where the current state of research into the subject matter is further expanded and the key concepts are discussed. In chapter two, crowdfunding in general and equity crowdfunding in particular are discussed and chapter three concentrates on start-up valuation and how it pertains to valuation in equity crowdfunding. Finally, these two chapters are concluded in chapter four, and the theoretical framework used in this thesis are defined in detail.

The dataset from the equity crowdfunding campaigns at the Invesdor.com portal and the methods used to analyse it are described in chapter five under the topic of data and methods. The main findings and the models formed are presented in chapter six, followed by discussion and analysis of the findings. The final conclusions of the thesis are presented in chapter seven, where the research is summarized, and its implications are shown. The final chapter is then completed by a discussion on the limitations of this work as well as possible suggestions for topics for further research.

2. EQUITY CROWDFUNDING

This chapter starts the review of relevant literature for this thesis by concentrating on the topic of crowdfunding and equity crowdfunding in particular. First, (equity) crowdfunding is discussed in general as a platform-mediated network and the incentives driving the three sides (the companies seeking funding, the investors, and the crowdfunding platform), as well as some of the related risks, are briefly discussed. Next, equity crowdfunding is discussed in relation to venture capital and business angel investing. After this, the motivations and considerations of the entrepreneurs seeking funding through equity crowdfunding are discussed followed by similar discussion from the viewpoint of the funders or investors.

The literature review draws on existing equity crowdfunding literature as well as literature on other forms of non-equity-based crowdfunding since their underlying dynamics are very similar in some aspects (Lukkarinen et al., 2016). Other forms of early-stage financing such as business angel and venture capital financing are also used where appropriate.

2.1 Equity Crowdfunding in Relation to Other Forms of Funding

Lukkarinen et al. (2016) cite the lack of theory on equity crowdfunding as a reason to building the theoretical base for their research from the theories on business angels and venture capital as well as on non-equity-based crowdfunding as these forms of funding are closest to equity crowdfunding in the financing cycle (see figure 4). A similar approach has been used also by Dorff (2014) and Manchanda and Muralidharan, (2014) who compared equity crowdfunding with angel investing and venture capital investing. The similarities and differences between reward-

based crowdfunding, equity crowdfunding, business angels and venture capital are summarized in table 2, where the similarities are highlighted.

Table 2. Key features of equity crowdfunding and related forms of funding (Lukkarinen et al., 2016).

Features	Reward-based crowd-funding	Equity crowdfunding	Business angels	Venture capital
Typical funder background	Various, many have no investment experience	Various, many have no investment experience	Former entrepreneurs	Finance, consulting, industry
Source of funds	Investing own money	Investing own money	Investing own money	Investing other people's money
Funding in-struments	Non-financial, e.g., products	Shares	Shares	Shares
Deal flow	Through web platform	Through web platform	Through social and/or angel networks	Through social networks and proactive outreach
Due diligence	Very limited; may be conducted by an individual, if at all	Conducted by an indi-vidual, if at all	Conducted by individu-als based on their own experience	Conducted by staff in VC firm with potential assis-tance from outside firms
Geographic proximity of funders	Investments made online: funders often distant from venture	Investments made online: funders often distant from venture	Most investments local	Invest nationally (or internationally with lo-cal partners)
Post-funding role of funders	Most remain passive	Most remain passive	Active (hands-on)	Active (strategic)
Return on investment	Financial return not relevant	Financial return im-portant (but not the only reason for investing)	Financial return im-portant (but not the only reason for investing)	Financial return critical

While the similarities between these forms of finance are clear and justify the use of a shared theoretical basis, the differences are also very important to note. Mostly they are connected to the different capabilities between most unprofessional investors participating in crowdfunding and business angels or venture capitalists to participate in the different aspects of the transaction and to access and assess information related to the company. These are in addition to the obvious differences which may exist in their profit motives. All this points to the fact that information asymmetry[1] plays an important role in equity crowdfunding, just as in all forms of investing. And because the methods and means at the disposal of these different investor types to mitigate the problem are so different,

[1] Asymmetric information: Information relating to a transaction in which one party has relevant information that is not known by or available to the other party ("Asymmetric information", 2019). In economics and contract theory, information asymmetry affects decision making when one party is better informed than the other leading to an imbalance of power, which can result in a market failure.

information asymmetry and the different mitigation strategies may be the most important factors in explaining the differences between the different types of investor groups.

An important point to also consider while building a theoretical basis for a study on equity crowdfunding is the fact that most of the prior studies are based on observations from one or a few crowdfunding platforms. Borello et al. (2015) study 21 European equity crowdfunding platforms including Invesdor. They find the platforms quite heterogeneous in many ways, but they recognize some platform characteristics to be significant for the development of equity crowdfunding.

The differences in how the platforms and mechanisms are set-up, as well as the type of equity offered in return for the crowdfunding investments that take place on these platforms, may appear relatively minor, but they may affect the incentives of the participants in significant ways. Similarly, differences in the legal aspects of crowdfunding between countries as well as different platforms may affect investor (as well as entrepreneur) behaviour significantly. This means that, while some conclusions from studies on equity crowdfunding are more or less universal, others are much less so and a few findings are quite contradictory.

Ley and Weaven (2011) explored how crowdfunding could be adopted for providing equity financing in a start-up context focusing on agency dynamics. They took a venture capitalist perspective on the crowdfunding investment model. Ley and Weaven (2011) note that compared to crowdfunding, venture capital can be considered as 'informed capital' due to its focus on screening, monitoring and advising start-up company operations. In this, business angels are quite similar, whereas the level of sophistication of persons investing in equity crowdfunding may vary more. This has different implications for how the principal-agent relationship is best handled (e.g. different legislation) (Sahlman, 1990). For business angels and venture capital, the investment process and its steps are better defined into the initial screening, due diligence, contractual control, post-investment monitoring and exiting.

Ley and Weaven (2011) provide criteria for identifying which type of start-ups are appropriate candidates for financing through crowdfunding in comparison to other forms of early-stage finance. They conclude that

start-ups with high information sensitivity, complex due diligence requirements, and a long duration before an available exit would not be appropriate candidates for crowdfunding. The business angel and venture capital solutions to controlling the relevant agency related problems and costs are quite different from those available in equity crowdfunding (Ley and Weaven, 2011). Generally, this can be seen as an increased risk in crowdfunding which may affect both the size and the terms of the investments made through crowdfunding.

2.2 Crowdfunding as a Two-Sided Platform-Mediated Network

Crowdfunding can be considered in the context of a two-sided platform-mediated network exhibiting demand-side economies of scale (Belleflamme et al., 2015; Belleflamme and Lambert, 2014). The crowdfunding platform networks consist of three distinct groups with different characteristics: the funders, the fundraisers, and the platform providers. Crowdfunding platforms offer both the funders and the entrepreneurs higher prospects of success at a much lower cost than without the platform (Belleflamme and Lambert, 2014). Much of the perceived advantage depends on how the platform manages the question of information asymmetry and related issues.

2.2.1 Mitigation of Information Asymmetry

The incentives of the crowdfunding platform are clearly financial as they typically are for-profit companies. Thus, they aim to maximize the number as well as the size of successful projects (Agrawal et al., 2014). More precisely, from the platform providers' point of view, the quality of crowdfunding campaigns needs to be high and the number of concurrently running campaigns balanced to maximize the positive but minimize the negative same- and cross-side network effects i.e. the platform should have an attractive mix of running equity crowdfunding campaigns at all times while at the same time minimising the cannibalisation that takes place between campaigns.

Agrawal et al. (2014) propose that the platforms main concern is to lower the information asymmetry as low as possible and to make the assessment of the true project or venture quality as easy as possible. Belleflamme et al. (2015) also suggest that the crowdfunding platform's main function as a platform-mediated network provider is to act as a means to ease the number of issues concerning asymmetric information. The funders lack information on the probability of success for the campaign and for the true expected return on the investment.

Problems of information asymmetry manifest both *ex-ante* (or pre-) investment and *ex-post* (or post-) investment. The *ex-ante* investment problems are related to increased uncertainty while *ex-post* investment problems are related to agency issues meaning that the entrepreneur may behave with his own best interest in mind and not that of the investors (Gilson, 2003; Ibrahim, 2015). This ex-post lack of influence of the crowdfunding investors in the firm may also result in a market failure (Agrawal et al., 2014).

Venture capitalists and business angels may alleviate these start-up risks with e.g. detailed contracts and staged release of funds or more informal means of risk mitigation e.g. expert technical knowledge in the field and face-to-face meetings with the entrepreneurs. These means are prohibitively costly for the investors partaking in equity crowdfunding. They must rely on other means where the crowdfunding platform should play a significant role.

Information asymmetry is a difficult issue to address for the crowdfunding platform. The challenges from the funders' perspective are quite obvious. Information asymmetry results in a principal-agent problem, which is especially challenging for the crowdfunding investors (the principals) as their means to observe and influence the entrepreneurs (the agents) are more limited than in a publicly traded company. According to Agrawal et al. (2014), the early stage of the ventures raising capital makes the information asymmetry problem worse especially in the case of a lightly regulated environment such as crowdfunding. The opportunities for funders to perform due diligence in person are limited. This may lead to market failure.

In comparison, venture capital or business angel investors typically have a larger stake and, thus, a larger and more direct role in the company. As the individual investments are typically rather small, there may be an increased tendency of the small investors to freeride. This makes the signalling function of the platform especially important. Investments during the early part of the campaign (the hidden phase) by funders more closely connected to the company and the entrepreneurs (through prior social links) is a signal to others of the high potential of the campaign and the company.

If the platform is not successful in lowering the information asymmetry, the investors severely discount the value of equity of the crowdfunding campaigns on the platform. This may lead to adverse selection as high-quality ventures avoid raising capital through crowdfunding if they cannot get a reasonable price for their equity. This results in a suboptimal equilibrium where only low- quality ventures get their funding through crowdfunding (Agrawal et al., 2014). The worst case scenario would be the Akerlof type market failure (Akerlof, 1970) i.e. where transactions which are value-creating between the companies and funders are passed over due to the information problem and where the whole market ends in failure. Market failure may also be the result of ex-post lack of influence of the funders in the firm (Agrawal et al., 2014).

If most funders participating in an equity crowdfunding platform are not sophisticated investors, as is often suggested, problems with hidden information may become crucial and the signalling role of the crowd may be less effective. At worst, the success of the business model of the crowdfunding platform may be challenged by the resulting adverse selection problem. A potential way to mitigate the problem is screening by the crowdfunding platform itself and complementary sources of information describing the firms seeking funding in terms of soft or hard information as well as signalling (Belleflamme et al., 2015).

In general, the crowdfunding platform has the following means to prevent market failures: reputation signalling, rules and regulation (legislative, industry and platform), crowd due diligence, and provision point mechanism (Agrawal et al., 2014). The equity crowdfunding process is illustrated below in figure 5. The tasks typically carried out by the venture capital or business angel investors are in equity crowdfunding carried out

jointly by both the platform and the investors as described in more detail in figure 5.

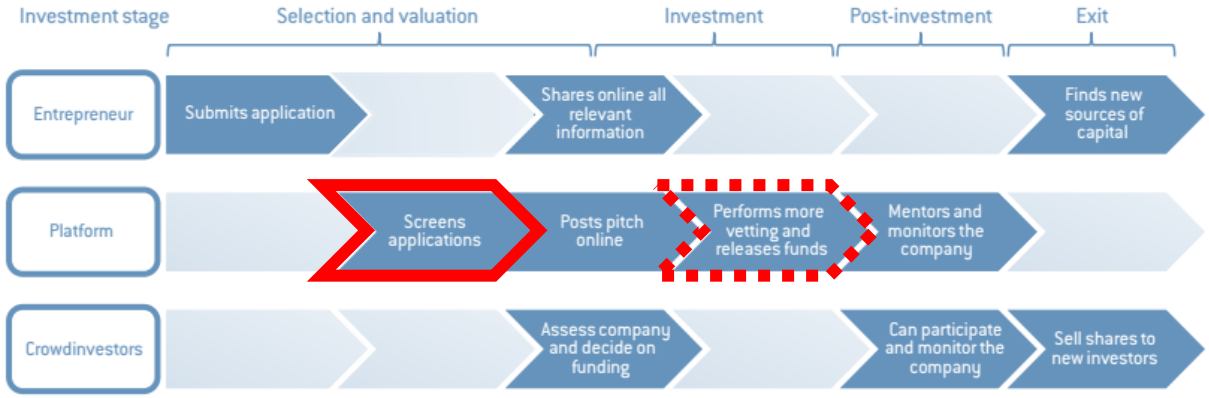

Figure 5. Equity Crowdfunding Process and the Roles of the Participants (Wilson and Testoni, 2014) (the author's highlight).

The crowdfunding platform often plays a significant role in the selection and valuation of the enterprise, the actual investment and post-investment phases of the process (Wilson and Testoni, 2014). The due diligence carried out by the platform in screening the submitted applications is important, as the possibilities and skills of average equity crowdfunding investors vary. During and after the investment the platform may continue to vet, monitor, and mentor the company (the crowd investors can participate and monitor the company also). Borello et al. (2015) also, in their study of 21 European equity crowdfunding platforms including Invesdor, underscore the importance of the due diligence performed by the crowdfunding platforms before posting the projects online in protecting funders and decreasing the level of risk associated with their investment decision.

Another form of mitigating risks is associated with the exit phase. A secondary market for the equity bought through the crowdfunding platform guarantees the liquidity of the investment to some degree (Borello et al., 2015) which may be vitally important. The crowdfunding platforms have recently started to offer their services also on the exit phase for the equity crowdfunding investors. They pool the investments from the crowd into a holding company which makes an investment in the company. The advantage of this model is that during (and before) the exit phase the company needs only to interact with one party instead of the crowd (a large number of small investors) (Hornuf and Schwienbacher, 2017).

2.2.2 Network Effects and the Need for Coordination

Belleflamme et al. (2015) state that crowdfunding platforms also exhibit positive cross-side network effects between funders and fundraisers. Theoretically, a higher number of funders on a platform makes it easier for the entrepreneurs to find a sufficient number of funders interested in their campaign, while a higher number of campaigns make it easier for a funder to find a campaign, they are willing to invest in. Same-side network effects may be also present. They may be both positive and negative. While a larger number of concurrent campaigns make the platform more attractive to investors and thus more attractive for the companies, they also may make it harder for the campaigns to reach their targets (Belleflamme et al., 2015). This is due to a lack of coordination between the funders. The platform also can assume a role in facilitating coordination by directing funders to campaigns getting close to being successful and thus avoiding possible coordination failures (Belleflamme et al., 2015).

However, this may not necessarily be the case always for all funders as it is evident that many funders are in some way socially connected to the companies prior to the campaigns (Lukkarinen et al., 2016) and only a few are repeat investors. This means that the matching function of the equity crowdfunding platform may not always be important and that their main function is to facilitate and formalize the financial transaction (Agrawal et al., 2014).

2.3 Crowdfunding dynamics

If equity crowdfunding is compared to other forms of crowdfunding the problem confronting the funder or investor is very different. The investors make an investment decision which involves a clear risk of uncertain future reward. In other forms of crowdfunding the rewards, such as they may be, are much simpler to evaluate and the decision often is much more like a consumption decision. The product, service and/or the emotional reward of participation are easier to evaluate and are achieved during a shorter time frame. In equity crowdfunding, the investors only achieve a reward if the company or start-up are successful and that uncertain reward is typically in the undefined future as the exit plans of typical equity crowdfunding campaigns are not well defined.

In equity crowdfunding, the amount of equity is limited while in reward-based crowdfunding the offer is either open-ended or only artificially limited (Hornuf and Schwienbacher, 2017). This difference may also be seen from the campaign dynamics. Hornuf and Schwienbacher (2017) fund that in reward-based crowdfunding the campaign dynamics are typically U-shaped with increased interest during the beginning as well as the closing of the campaign. Equity crowdfunding campaigns, on the other hand, have been reported to exhibit L-shaped dynamics with high interest in the beginning and only relatively weak end-of-campaign effect. The opposite may also be true as has been reported e.g. by Crosetto and Regner (2018) in their analysis of German reward-based and donation-based crowdfunding platform Startnext, and it should be noted that the findings of Hornuf and Schwienbacher (2017) may depend largely on the dynamics specific to the platforms they have observed.

In this respect, crowdfunding campaigns are highly heterogeneous. According to Vulkan et al. (2016) the campaigns which are successful receive nearly all of the investments made in a given month and they very often exceed the target clearly. On the other hand, campaigns which are not successful in the end typically fail by a large margin (Vulkan et al., 2016; Wallmeroth et al., 2018). Agrawal et al. (2014) also suggest that crowdfunding is highly skewed with a large number of campaigns failing to raise any money and few raising a significant part of the total.

Robertson and Wooster (2015) also find that early success is vital for campaigns' overall success in a donation-based crowdfunding setting. The more money a campaign manages to raise early, the more money overall and the higher percentage of their goal they manage to raise and the higher is their likelihood of success. Early contributions to crowdfunding campaigns are a clear signal to attract other investors and, thus, important to the success of crowdfunding campaigns and the crowdfunding platform. The owners of the crowdfunding campaigns should facilitate and stimulate such bidding in order to maximize their chances of success (Vismara, 2016a). In equity crowdfunding, the evidence shows the propensity for inference i.e. projects with higher initial funding are more likely to get funded. These results could be interpreted as herding behaviour (Belleflamme et al., 2015).

2.4 Crowdfunding from the Entrepreneur's Perspective

Agrawal et al. (2014) summarize the incentives of all the actors in equity crowdfunding. For the firms seeking funding through equity crowdfunding, the two primary incentives are the lower cost of capital and access to more information. Compared to more traditional means of funding the lower cost of capital of crowdfunding is due to three reasons, better matches, the possibility of bundling the equity offer with other offers and better information at a lower search cost. More information means other effects in addition to the cost of capital like easier access to early demand estimates.

2.4.1 Different Stages Firms – Different Entrepreneur Motives

Companies may seek funding through equity crowdfunding campaigns at very different stages of their financing cycle (see figure 4). Besides funding, other companies' main motivation to engage in equity crowdfunding may be something else entirely e.g. market information, marketing etc. (Wilson and Testoni, 2014). This may influence the way companies approach their crowdfunding campaigns.

Belleflamme et al. (2010) review the formation of the crowdfunding industry during the 2000s and make observations from an Industrial Organization or economist point of view. They observe that crowdfunding is more than just funding and that crowdfunding may be used by companies for testing, promotion, and marketing of their products. Gaining a better understanding of consumer tastes is also important especially when creating a new product or service offerings. Thus, product or concept validation may be more important than additional funding (Brown et al., 2015).

Rossi (2014) also recognises the usefulness of crowdfunding as a promotional tool and as a means to carry out customer research. It is typical in reward-based crowdfunding especially, that the funders participate in the development of the product or service through feedback. Crowdfunding can, thus, also be used for the idea and product validation prior to entering the market.

2.4.2 Crowdfunding as a Source of Information

Agrawal et al. (2014) note that one feature of crowdfunding may be advance selling, which provides incentive compatible demand signals, unlike most marketing research. Users and investors typically have mechanisms to give input on the product or business plan of the firm seeking funding. The freer flow of information could also be a disincentive as not all firms are willing to share information on their product or business plan to the extent necessary (Agrawal et al., 2014) and therefore crowdfunding is not the best solution for every company. Also, business angels and venture capitalists can provide the firm with other kinds of information which may be even more important depending on the situation of the firm.

Besides funding, crowdfunding is thus also about information (Belleflamme et al., 2010; Belleflamme and Lambert, 2014; Mollick, 2014). Entrepreneurs can also use successful crowdfunding campaigns to signal their creditworthiness and thus attract funding from venture capitalists or gain access to bank loans (Belleflamme et al., 2015).

Signalling by the entrepreneurs differs depending on the target investor group (Ahlers et al., 2015). The signals directed to crowd investors differ from those meant for business angels or venture capitalists. This is mainly due to the crowd's perceived lack of financial sophistication as well as a lack of experience in assessing the value of start-ups and their founding teams.

Entrepreneurs also provide additional information such as financial forecasts or projections to potential investors as a means to signal lower risk and higher quality. The type of information best suited depends on the type of investors in question. Ahlers et al (2015) also note that a powerful way to signal high quality is for the entrepreneurs to invest indirectly in their own company and by keeping their share of the equity sufficiently high.

2.4.3 Risk of Failure in Equity Crowdfunding

In the absence of a market mechanism to judge the validity of the company valuation, even being able to come to a valuation acceptable for the crowd has its own intrinsic value. This is not without risk, however. If the

business idea is difficult to understand for the crowd and the campaign fails as a result, the company reputation (and value) may suffer (Brown et al., 2015). Also, the negative attitudes and perceptions of business partners and potential investors in the next rounds of financing (Juva, 2017, p. 80) are one of the perceived risks of crowdfunding.

In some fields testing interest in a product, adjusting through "pivots", and quickly ending business endeavours without sufficiently high prospects may be desirable ("failing early, fail often, fail forward"). Crowdfunding makes it easier to gauge public demand for the product or service, without additional capital investment and with minimal effort (Mollick, 2014).

2.5 Crowdfunding from the Funder's Perspective

The funders are a very heterogeneous group. Nevertheless, Agrawal et al. (2014) recognize at least the following five incentives for them: easier access to investment opportunities, early access to new products (reward-based or hybrid crowdfunding), community participation i.e. connection to the firm and other investors, opportunity to support a product, service, or an idea for its social or other merits apart from financial incentives, and finally a way to formalize contracts which persons previously connected to the firm might have made regardless.

The success or failure of a crowdfunding campaign depends on the interest it generates in the pool of potential funders and how well it transforms this interest into actual investments. According to Lukkarinen et al. (2016), the investment decisions in equity crowdfunding are more similar to other types of crowdfunding than traditional early-stage financing. Never the less, in the case of equity crowdfunding, the profit motive, while not the only one, should be considered as an important one.

2.5.1 Information Asymmetry in Funder Decision Making

As pointed out above, mitigating the effects of information asymmetry is an important consideration for the funders. Because the funders gain valuable information based on the actions of other funders (e.g. perceived information on any due diligence carried out), this may result in freeriding, which may subsequently lead to a market failure. In such a case all

investors have an incentive to wait and delay taking action to as late as possible. Because of this, there exists some form of "provision point mechanism" on most crowdfunding platforms (Agrawal et al., 2014). The crowdfunding campaigns only receive the funds if the campaign is successful i.e. the minimum threshold is reached. Agrawal et al. (2014) assume that the platform only gets paid then as well. Many platforms also charge a fixed fee which applies to unsuccessful campaigns as well. The implementation of a provision point mechanism eliminates the risk to funders of providing funds for campaigns which are not eventually deemed viable (Agrawal et al., 2014).

Belleflamme et al. (2015) also note that since crowdfunding follows a sequential process, and since all sides involved gain more useful information as the process progresses, both sides select their courses of action based on the previous actions of all the others. The process may be viewed as a sequential game. From the point of view of the firms seeking funding delaying, which may be a very viable course of action for the funders especially early because of the value of the information acquired by observing the actions others, may be very detrimental to their chances of success. Belleflamme et al. (2015) note evidence of both free-riding behaviour as well as interference of the early success of the crowdfunding campaign. Some of the evidence they discuss is based on donation-based crowdfunding where free-riding may dominate i.e. the overall success of a crowdfunding campaign is negatively correlated with its initial success. Kuppuswamy and Bayus (2015) report similar findings based on Kickstarter campaign panel data.

2.5.2 Success Drivers from the Funder's Perspective

As mentioned in the introduction, success drivers in equity crowdfunding have not been studied extensively and the number of published studies while growing is still far from comprehensive. These are the characteristics which the potential funders interpret as signals of quality and success potential and which thus drive to campaign success.

The success drivers of crowdfunding campaigns can be divided into three main categories, which are campaign characteristics, networks, and understandability of the company's concept and offering. These have

been found to correlate better with campaign success over more traditional investment criteria e.g. business, financial and legal features (Lukkarinen et al., 2016). Hornuf and Neuenkirch (2017) also find that campaign characteristics influence campaign success. They also find that investor sophistication is influential.

In analysing a large dataset of reward-based crowdfunding (i.e. not equity crowdfunding) campaigns (48 526 campaigns on Kickstarter from its inception in 2009 to July, 2012), Mollick (2014) found a connection between both social capital and preparedness, and an increased chance of project success concluding that quality signals play a significant role in campaign success.

Also, Mollick (2014) concluded based on the relevance of quality signals and their effect, that the persons contributing to crowdfunding campaigns assess the success potential of the crowdfunding campaigns and that quality signals are central to that assessment. Assessing quality, legitimacy, and preparedness of the campaigns through the online crowdfunding platform is not as clearly defined as in traditional new venture settings. For campaign success, project quality is important as are signals of preparedness to complete the project for which the funding is being sought. This result was confirmed by Wash (2013) and Frydrych et al. (2014), who both found a clear completion bias in their studies on donation-based crowdfunding. Projects being near reaching their target have a high probability of doing so and donations which complete a project by raising its total up to its target are significantly larger than normal donations. Ley and Weaven (2011) came to a similar conclusion after interviewing venture capitalists on the topic of equity crowdfunding, who saw this type of behaviour as problematic and felt that equity crowdfunding should be limited to knowledgeable investors.

Frydrych et al. (2014) based their analysis on 421 campaigns on Kickstarter in New York between June and July 2012. They found that funders prefer more credible campaigns in general with better signals of quality and preparedness (better presentations and more experienced team). The visual quality of the presentation material was also seen to matter, but they argue that high quality has become the standard in

crowdfunding presentations which has weakened its predicting power regarding success (Frydrych et al., 2014). Also, smaller, easier to understand campaigns are preferred as the perceived risk is lower.

Typically, early-stage traditional entrepreneurial financing is relatively local because business angels and venture capitalists may carry out due diligence easier for businesses situated within relative geographical proximity. Also, funding from friends and family (typically nearby) plays an important role. In crowdfunding, this may not necessarily be the case as the funders' methods of information seeking take place largely through the crowdfunding platform and not in person. The average distance between funder and the firm is often much longer in crowdfunding as it has become irrelevant to some degree. Agrawal et al. (2011) report an average distance of approximately 3 000 miles on the crowdfunding platform Sellaband. Thus, we can conclude that crowdfunding may channel funds from both traditional sources e.g. friends, family and other social networks and the crowd which may include prior existing online social network as well as people not connected with the entrepreneurs.

2.5.2.1 Campaign Characteristics

Much of the research into the success drivers of crowdfunding campaigns concentrate on campaign characteristics. Lukkarinen et. al. (2016) selected to focus on the following four the funding target, the minimum investment, campaign duration, and the provision of financials. Their importance lies in the fact that all of them can be selected prior to the campaign by the entrepreneur and the crowdfunding platform.

Equity crowdfunding typically operates under the "all-or-nothing" model, where the entrepreneur receives no funds unless the campaign minimum target set by the entrepreneur is reached and only after this does the company receive the invested funds. This makes setting a realistic minimum target essential as the funds need to be in proportion both to the project requiring funding and the share of the equity offered. The investor faces contradictory incentives with the size of the funding target in equity crowdfunding. While the smaller target is easier to reach, it has only limited possibilities to have a positive influence on the prospects of the project or firm seeking funding. Too large target, on the other hand, is both difficult to reach and may be out of proportion to the proposed

project and the equity share offered. Maybe because of these mixed incentives the evidence is also mixed. In equity crowdfunding, it would appear that the funding target and the number of investors are not related in a significant way (Ahlers et al., 2015) or the correlation is a positive one (Belleflamme et al., 2014). On the other hand, in reward-based crowdfunding, where the incentives are slightly different, higher funding target correlated negatively with campaign success (Belleflamme et al., 2014; Cumming et al., 2015; Mollick, 2014).

Belleflamme et al. (2014) (and Sahm et al., 2014) study crowdfunding from a viewpoint of more theoretical economics and in particular how the amount of funds needed to be raised affects the individual rationality of the funders in either reward-based or profit sharing form of crowdfunding. They note that crowdfunding allows for price discrimination and thus stress the need to build a community that ultimately enjoys additional private benefits from participation to make crowdfunding a viable.

The minimum investment possible is typically set either by the crowdfunding platform or the particular campaign. While it is significant, its role in campaign success has not been specifically studied according to Lukkarinen et. al. (2016), who conclude that, based on the data analysed by Ahlers et al. (2015), it appears to have no statistical significance.

Campaign duration appears to be negatively correlated with campaign success (Cumming et al., 2015; Mollick, 2014). Two sets of contradictory incentives seem plausible. Longer campaigns make it possible for the communication about the campaigns to reach the crowd (Burtch et al., 2013), but at the same time, they lower the believability of that communication as well as fail to create a sense of urgency among the investors (Mollick, 2014).

It is typical for especially equity crowdfunding platforms to include financial information e.g. forecast or historical profit and/or revenue figures as a matter of routine. The lack of such financial data has been found to negatively correlate with campaign success (Ahlers et al., 2015; Mollick, 2014).

These analyses do not factor the quality of such financial disclosures into account in any way. In the case of this study that is essential as the valuation multiples in question are directly based on the forecasts in

question and their accuracy, validity and plausibility are indirectly being analysed.

2.5.2.2 Network Characteristics

Ordanini et al. (2011) observe in their study combining both donation and equity crowdfunding that as the accumulation of investments slows down during the second phase, a cascading process of engaging the crowd directly and through word-of-mouth communications is needed in order to be successful. They call this the "getting the crowd" phase. The campaigns that stagnate and fail to leave this phase, i.e. fail to trigger the crowding process, very often fail as this is the main reason for the failure of crowdfunding campaign (Ordanini et al., 2011).

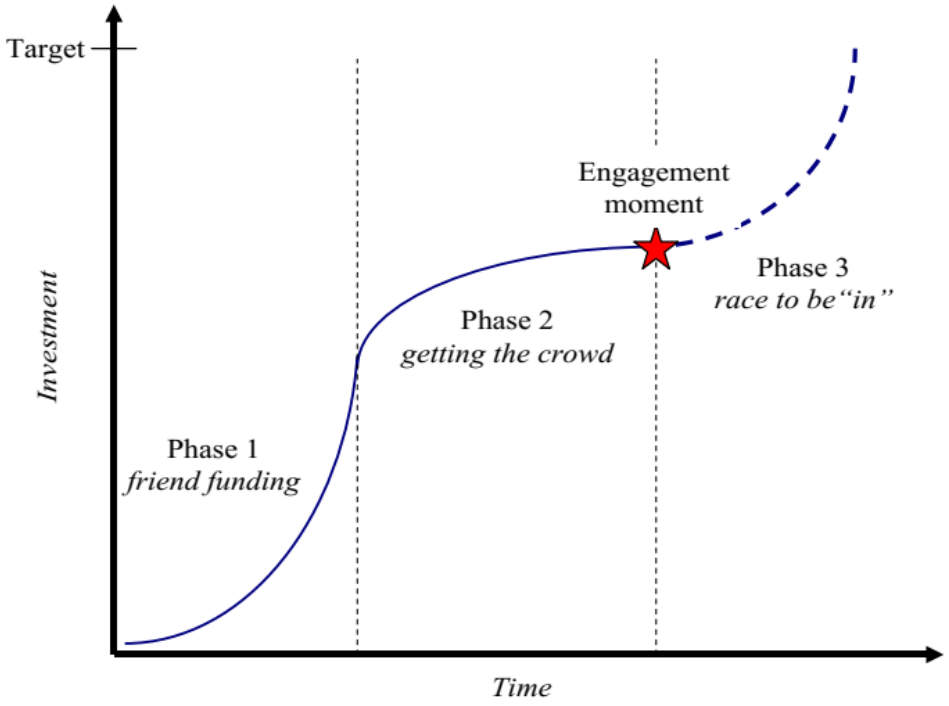

Figure 6. The three phases of crowdfunding (Ordanini et al., 2011).

For a few of the successful campaigns, an "engagement moment" arises after which a chain reaction leads to rapid growth of investments until the target is reached (Ordanini et al., 2011). Most of the investors during this phase have no prior relationship with the campaign or the entrepreneurs. Ordanini et al. (2011) call this phase after the engagement moment a "race to be in" stage and cite as one of the motivations the finite nature of the investment opportunity. These findings are very much in

line with Lukkarinen et al. (2016) who describe the network characteristics to be influential either through the funding collected prior to the campaign or the social media presence of the entrepreneurs or the crowdfunding campaign. While these are the network characteristics entrepreneurs may most easily influence, there may be others more directly related to the heterogeneity of the crowd and the type of investors present in the crowd as well as the type of interactions between these different types of investors.

Existing social networks and the amount of funds collected prior to the actual campaign and early on during the campaign are closely related as much of the early funding is drawn from this pool of friends and family. Polzin et al. (2018) divide the crowd based on their closeness to the owners of the crowdfunding campaign into the in-crowd, those having some form of prior personal ties, and into the out-crowd, those having no personal ties. The reasoning is that social networks are an important means to signal crowdfunding campaign quality instead of formal sources of information and seen as more accurate and proprietary, which makes them better than publicly available information. This use of soft information is in line with Ahlers et al. (2015) and Lukkarinen et al. (2016). Due to their existing relationship, this information is less costly for the in-crowd than the out-crowd.

The out-crowd bases their investment decision more on expected results (Polzin et al., 2018) whereas the in-crowd is affected by social capital or community benefits (Belleflamme et al., 2014). The out-crowd is not affected as much by information about the entrepreneurs or the project team as there is no prior relationship to enforce social reward or punishment to reduce the moral hazard (Belleflamme et al., 2014; Vismara, 2016a). On the other hand, the out-crowd relies more on information on the finances and risk for quality signals (Ahlers et al., 2015; Polzin et al., 2018). The results of Polzin *et al.* (2018) suggest that a prior relationship between the funder and the entrepreneur is to some extent a substitute for financial due diligence.

Mollick (2014) also found active social networks to be important for crowdfunding campaign success. Active social network ties act by channelling financing from friends and family as well as a way to seek promotion and a means to strengthen the legitimacy of the campaign. From the

platform and policymakers perspectives, all actions, which make the ways in which campaigns may signal quality both easier and better defined, are positive such as rich descriptions, which are in some way standardized and reduce information asymmetry and help the communities of funders to identify quality projects. The legislation and related regulations increasing investor protections should in this light act in lowering barriers to investment as concluded also by the Ministry of Finance (2016b). While these results are derived from reward-based crowdfunding they, nevertheless, are relevant as the emphasis in equity crowdfunding may not be solely on the financial return of the investment and it may vary greatly from funder to funder and from campaign to campaign (see also Table 2).

The influence of the size of social media networks and campaign success is not entirely clear. Some research suggests a positive correlation while others fail to find one. In reward-based crowdfunding (Kickstarter) a strong positive relationship has been found (Mollick, 2014), while Belleflamme et al. (2013), as well as Cumming et al. (2015), fail to find a relationship between social media network size (or the number of links to social media websites) and success in different forms of crowdfunding.

Vismara (2016b) investigated both social capital as well as equity retention and the role they have in signalling. Based on 271 campaigns listed on Crowdcube and Seedrs (two UK equity crowdfunding platforms) in 2011–2014, they found that social capital correlated with success. Also, the size of the fraction of the company listed for sale negatively correlated with success i.e. high equity retention correlates positively with success.

It is often assumed that most investors on crowdfunding platforms are amateur investors with little or no expertise in the proper evaluation of start-ups or similar ventures (Agrawal et al., 2014; Belleflamme et al., 2014). However, a part of the crowd may well have entrepreneurial and start-up-related skills or industry-specific experience (Vismara, 2016a). These better informed or more sophisticated investors are more active investors than the average investor especially during the early stage of the crowdfunding campaign and as such, they play a crucial role in attracting other investors to make the campaign successful (Vismara, 2016a).

Hornuf and Schwienbacher (2017) concluded that larger investments were made by individuals who typically are better capable of more thorough financial due diligence and therefore such larger investments in the range of between €5 000 and €10 000 may convey a signal to other investors that a more sophisticated investor with such information is participating in the campaign. This may trigger the participation of other investors. It is apparent to all that due diligence is costly and economically only sensible in the case of large investments. This positive influence is especially apparent after the initial funding period i.e. after friends and family already have made their investments.

Also, it is not the size of the social network which seems to matter, but its activity, as the number of shares on Facebook correlates with success (Robertson and Wooster, 2015). Block et al. (2018) confirmed the positive effects of updates on the number and the amount of investments made by the crowd. They found that easy understandability of the updates was important while the length of updates was not. Updates about new developments such as new funding, business developments and cooperation projects were found especially effective whereas updates on the start-up team, business model, product developments, and promotional campaigns were not effective. Müllerleile and Joenssen (2015) also found the importance of the number of performed updates for campaign success, as well as also a realistic financing goal and the quality of available information online. To be successful campaigns should appear active and facilitate a forum for communication between funders during the campaign both pre- as well as post-investment.

The increased activity also works the other way. Dorfleitner et al. (2018) found that increased investor activity on a crowdfunding platform is associated with a subsequent increase in the number of updates the crowdfunding campaigns post. This is in response to the increasingly competitive environment. This indicates a clear strategic approach from the entrepreneurs. A tendency has been observed of the start-ups to increase communications in response to the funding target not yet being reached especially as the end of the funding period gets near (Dorfleitner et al., 2018).

Kim and Viswanathan (2018) studied the importance of early investor's expertise and its importance for the credible signal of quality for the other

investors in equity crowdfunding. Their dataset consisted of crowdfunding campaigns on Appbackr, an online crowdfunding marketplace for mobile apps. They found that technical expertise was important for earlier stage (apps in the pre-release stage) project campaign success, and investment expertise for later stages (apps that are already being sold in the market) (Kim and Viswanathan, 2018). So, even if funders in crowdfunding may be less sophisticated than business angels or venture capitalists, they do quite well in identifying and exploiting the expertise of the early investors in a crowdfunding campaign. The informational value of these signals is thus high. Their findings underline the value of expert participation, both technical as well as a business angel or venture capitalist, in crowdfunding.

The makeup of the crowd is clearly heterogeneous as noted earlier. Some members of the crowd are more significant for campaign success as for example in the sample used by Wallmeroth (2016) approximately 20% of investments generate nearly 80% of the total funds raised. In that sample of 42 997 investments, 82% of the investments were less than €500 and at the same time amounted to only 18% of the total funds. Only 2% of these investments were €5 000 or over but their contribution was approx. 40% of the total funds raised. Therefore, Wallmeroth (2016) finds large investments to play a vital role in the success of the crowdfunding campaigns. He also identifies two forms of investors: the strategic (or perhaps more sophisticated) investors and the less strategic (or perhaps less sophisticated) investors (Wallmeroth, 2016). The two most important investor groups in terms of investment are thus the so-called strategic investors as well as family & friends. (Wallmeroth, 2016). Strategic investors are also better than average investors at the initial selection and due diligence which is made evident by the lower bankruptcy rates among ventures they have invested in (Wallmeroth, 2016). Vismara (2016a) finds that some investors are more influential in signalling. Some investors (investors with public social media profiles linked to the crowdfunding platform) are highly influential especially during the initial days of the campaign which are typically very important for the overall success of the campaign by reducing the perceived uncertainty and risk. This is in line with the findings of Ahlers et al. (2015), Bruton et al. (2015) and Vismara (2016b).

The social aspect of crowdfunding is also apparent in the results of Zvilichovsky et al. (2013) on reward-based crowdfunding (not equity crowdfunding) that the probability of a campaign reaching its target increases with the number of campaigns the owner of the campaign has backed. Also, the total capital raised is higher for campaigns where the owner of the campaign has backed other campaigns compared with projects owned by non-backers. This applies, naturally, to crowdfunding campaigns where the owners and the backers of the campaigns act on both sides of the platform more or less simultaneously. Zvilichovsky et al. (2013) find that the project owners who actively participate on both sides of the platform have created a community of their own (backer-owners) distinct in its network dynamics (different from backer-only and owner-only communities). This form of *quid pro quo* or identifiable reciprocal behaviour is typical of peer-economy platforms, e.g. Airbnb, Uber, and Kickstarter. It appears that agents participating on both sides of these platforms may gain a competitive edge over their peers (Zvilichovsky et al., 2013).

It is evident that different groups within the crowd seek different information and use information differently based on their relationship with the entrepreneurs and their level of competence or sophistication.

Personal connections are important in financing start-ups through e.g. equity crowdfunding by facilitating information flow to help identification and assessment of investment opportunities (Agrawal et al., 2011).

In reward-based crowdfunding, the majority of collected funds are from the entrepreneurs' prior personal social networks and social media followers (Kuppuswamy and Bayus, 2015).

A considerable portion of the funds being invested during the early part of a crowdfunding campaign comes from private networks of the entrepreneurs, and early investments strongly impact later investments in crowdfunding due to less experienced investors being influenced by more expert investors' investment decisions (Kim and Viswanathan, 2018).

2.5.2.3 Understandability

It is widely understood that venture capital and business angel investors hold a high competence level of the entrepreneurial team as a key prerequisite for investment in a venture. According to Mollick (2014), funders

behave in a similar way when assessing the prospects of successful completion of a project in reward-based crowdfunding. The signals they look for are a demonstration of a proven history of success by the entrepreneur or third-party and signals of preparedness. Other criteria venture capital and business angel investors use are related to the product, the market, the company, and financial potential. For investors in equity crowdfunding with fewer means for analysing these, the understandability of the product or business concept may be critical.

As noted earlier, campaign understandability is seen as an important campaign characteristic which correlates with campaign success. The understandability of the project and the business idea seem to make it easier to judge the credibility of the other quality signals.

When Belleflamme et al. (2013) compared both equity and reward-based crowdfunding campaigns, they found somewhat surprisingly that non-profit organizations had the highest rates of success. Apparently, non-profit organizations appear more trustworthy to investors due to their lack of profit incentive. Belleflamme et al. (2013) also find that reward-based crowdfunding campaigns aimed at making a product have a tendency to attract larger amounts of capital than those offering a service. The required amount of funding may naturally have affected this result, but a tangible outcome may also be preferred by funders.

Thus, we can conclude that the success drivers for the crowdfunding campaign are connected either to the social or to the economic worthiness of the campaign as perceived by the funders.

3. VALUATION IN EQUITY CROWDFUNDING

This chapter continues the literature review part of the thesis by discussing the valuation methods used in early-stage finance. Business angel and venture capital literature is used where suitable due to their closeness to equity crowdfunding in the financing cycle (Collins and Pierrakis, 2012; Lukkarinen et al., 2016; Rossi, 2014) and the relevant aspects are applied into the equity crowdfunding context. First, however, the difference between enterprise value and equity value are discussed shortly.

3.1 Enterprise Value vs. Equity Value

Before going into the topic of start-up valuation, the difference between enterprise value and equity value are discussed. The equity value of a publicly traded firm is the sum value of all equity outstanding i.e. the value of shares multiplied by the number of shares (also called the market capitalization). The enterprise value takes into account the capital structure of the firm and accounts also for the claims of creditors as well as the shareholders. As such, the enterprise value is more comprehensive than equity value.

In the case of start-ups, the equity value is more difficult to estimate that for more mature companies, as will be discussed below, but the principle is the same. In the case of equity crowdfunding (or any other funding round), the relevant equity value is called the pre-money value. This valuation is made by the company in preparation for the campaign.

To calculate the enterprise value from the equity value, the company net debt needs to be added i.e. the market value of all outstanding debt is added and the valued of all cash and cash equivalents are deducted as shown in figure 7 below. This makes the resulting enterprise value capital

structure neutral and makes it possible to compare it to e.g. EBITDA and Sales without taking into consideration the costs related to any outstanding debt. Thus, enterprise value multiples EV/EBITDA and EV/Sales are used in this study.

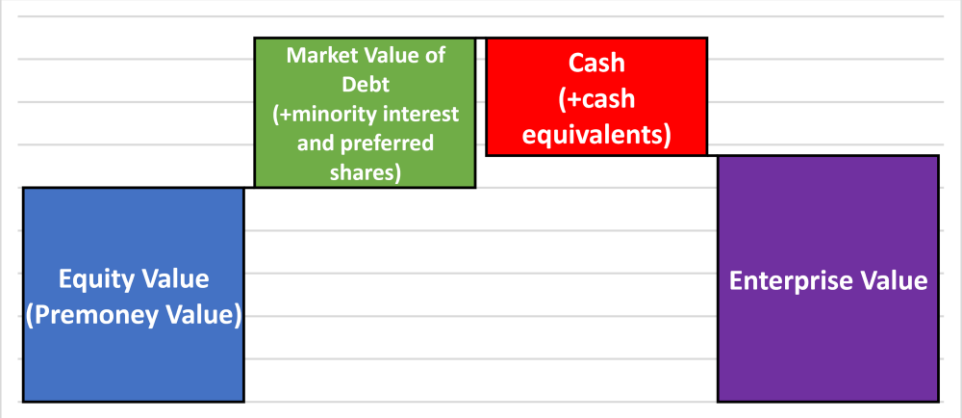

Figure 7. Calculation of Enterprise Value (EV).

Equity value multiples do exist and are widely used in finance, but they are not as applicable here. The difference is in how the net debt and the related interest payments (or interest revenues) are handled as demonstrated in figure 8.

Figure 8. Enterprise vs. Equity value and related multiples.

3.2 Challenges in Valuation of Start-ups

When an equity investor invests in a start-up company, they receive a share of equity in return. The size of this share is determined by the valuation of the company in the following way. The funding target for the crowdfunding campaign, the number of shares in the company offered in the campaign as well as the pre-money valuation of the company determine the equity share of the investment. The valuation is thus a central challenge for the equity crowdfunding campaign.

The formation of the valuation outside of publicly traded companies is a process where the aim is to find the intrinsic value of the company. In

the case of venture capital, business angel or equity crowdfunding valuation, it is relevant to differentiate between pre-money- and post-money-valuations. Post-money-valuation describes the market value of the company considering the investments which are being made and dilution of the existing shares. Pre-money-valuation describes the valuation prior to the financing round in question. This means that the difference between the two is the total amount of equity being invested.

One of the first stages of the crowdfunding process is making the company valuation and deciding the equity share to be offered and the amount of capital which the company is aiming to raise. Since these are interconnected, these decisions need to be done together. It is also an essential stage of the process because both the entrepreneurs and investors need to be satisfied with the fairness of the valuation of the company. This stage is not arbitrary for the success of the campaign. The difficulty of evaluation of a start-up is obvious, as the wrong valuation may have significant adverse effects on the success of the crowdfunding campaign (Collins and Pierrakis, 2012).

In venture capital or business angel funding, private investors are expected to possess a certain level of financial acumen and thus, to be knowledgeable of the evaluation methods used. They are typically also made privy to detailed information on the company in question (Palmiter, 2012). Then again, for example the SEC requires additional disclosure on valuations for small offerings (less than $50m under the JOBS Act) since it is felt that unsophisticated investors (crowdfunding investors) can typically not be expected to possess the skills or resources needed to perform the usual DCF/CAPM analysis (Palmiter, 2012). This makes the quality of these disclosures, the assumptions and the methods used important for the crowdfunding campaigns as well as the crowdfunding industry in general. Any notion of systematic over-pricing or other fraud could negatively influence the whole industry image in a significant way (Palmiter, 2012).

In entrepreneurial finance, much emphasis is on the ability of the entrepreneur to convince the investors of the merits of their venture on one hand and on the ability of the investor to make their own critical evaluation of the value of the company. In equity crowdfunding, the possibilities of the entrepreneurs to effectively engage with the potential investors are

limited by their lack of face-to-face access and by the fact that practically all information is disclosed openly through the crowdfunding platform. This limits the amount of proprietary and competitive information which can be divulged. Combine this with the fact that the potential investors are often less equipped to process the information available, to perform proper due diligence and to, in general, overcome the information asymmetry problem (Agrawal et al., 2014; Ahlers et al., 2015; Vismara, 2016b).

For the investor, valuation is connected with the price they pay for their share of the equity and for the entrepreneur it is connected with the price they get for their time and money they have invested in the company. The valuation process is typically complex and, in the venture capital or business angel setting the final valuation for each financing round is always formed through negotiations between the financiers and the entrepreneur. Suitable methods of valuation are based on predicting future growth and profitability.

Valuation of start-ups using traditional methods of valuation used for more established firms is very difficult for a number of reasons. Damodaran (2009) cites a number of characteristics affecting start-up valuation which most start-ups share however diverse they may otherwise be.

1. No history: Start-ups have typically very limited financial histories.
2. Small or no revenues, operating losses: It is common that the limited histories available may not be useful due to the limited operating detail in them. Either there are no revenues, or they are small. The expenses are more often than not associated with establishing the business rather than generating revenues. Significant operating losses are also typical.
3. Dependent on private equity: The equity for most start-ups is almost entirely provided by the founders, their family, and friends.
4. Many don't survive: The proportion of start-ups who survive to the next stage in their business lifecycle is low.
5. Multiple claims on equity: The equity of start-ups owned by other investors beyond the founders may come with varying equity claims on many dimensions. This may affect equity value.

6. Investments are illiquid: Since start-up equity is privately held and not publicly traded, their liquidity is considerably less than investments in similar publicly traded companies.

3.3 Overview of Relevant Valuation Methods

There are many different approaches to valuing different kinds of equity. The most obvious rely on attempting to estimate the intrinsic value of the earnings it is expected to generate.

3.3.1 Net Present Value Methods

The equations for calculating the valuation through the Discounted Cash Flow (DCF) method, the Residual Income Model (RIM) and the Dividend Discount Model (DDM) are shown below. The Discounted Cash Flow (DCF) approach (1) is a general approach for evaluating any investment based on the present value of the cash flows it will generate. The DCF is the sum of all the cash flows CF_i for a year i discounted with the relevant discount rate r. The Residual Income Model (RIM) (2) is basically similar with the valuation based on the present book value BV_0 and the sum of the discounted residual incomes RI_i (net income minus the equity charge) for a year i again using the relevant discount rate r. The Dividend Discount Model (DDM) (3) is calculated by summing the discounted (using discount rate r) dividends D_i for a year i. It is applicable for preferred stock (due to its dividend stream). Since all these are forward-looking estimates, all cash flows CF_i, residual incomes RI_i, and dividends D_i for a year i are predicted values.

(1) $$DCF = \sum_{i=1}^{n} \frac{CF_i}{(1+r)^i}$$

(2) $$RIM = BV_0 + \sum_{i=1}^{n} \frac{RI_i}{(1+r)^i}$$

(3) $$DDM = \sum_{i=1}^{n} \frac{D_i}{(1+r)^i}$$

3.3.2 Multiples Valuation Method

The Multiples Valuation Method (MVM) takes a different approach and therefore it does not require detailed multi-year forecasts of dividends, free cash flows or residual incomes. Instead, the basis of valuation is the known valuations of firms in a suitable comparable peer group. The approach is thus based more on the opportunity cost and not the absolute value and it relies much on the correct valuations of the peer group companies in relation to which the company is being evaluated (Schreiner and Spremann, 2007).

Schreiner and Spremann (2007) make several conclusions on the usefulness and accuracy of different valuation multiples used in typical evaluations.

1) Equity value multiples outperform entity value multiples,
2) knowledge-related multiples[2] are more accurate than traditional multiples and
3) forward-looking multiples, in particular, the two-year forward-looking price to earnings (P/E) multiple, outperform trailing multiples.

The first and third findings are especially relevant for the present study. Unfortunately, the available forecasts do not address the debt-related costs and therefore the equity related multiples (like P/E) cannot be used.

3.4 The VC Method

For start-ups the proportion of the terminal value (value at the end of the valuation period) to the overall value of the company is large (and in the case of net losses over the valuation period it may be even more than

[2] In many industries, like the technology sector, investments into research and development (R&D) can be a significant expenditure as well as a major investment into the future productivity of the firm. However, normal accounting practices enable capitalization and periodic depreciation of only physical forms of long-term investments, and even when possible, the amortization of capitalized intangible assets is too conservative in the estimate of useful amortization time. This distorts the financial statements underestimating the "true" earnings. As a result, Schreiner and Spremann (2007) conclude that adding e.g. the R&D expenditures and/or amortization to EBIT results in more reliable multiples such as P/(E+R&D).

100% of the current value). As a result, estimates concerning the likelihood of reaching the stable growth stage, what is the time before the stable growth stage is reached, and what is the company outlook like when the stable growth stage has been reached, all have a large effect on the valuation.

The exit or terminal value is central to the VC method and two approaches are used for their estimation: the Discounted Cash Flow (DCF) analysis (absolute valuation) and multiples or comparables analysis (relative valuation) (Metrick and Yasuda, 2010).

Start-ups progress through multiple stages of growth or financing cycles (see figure 4, (Rossi, 2014)). The VC method is based on estimating the exit or terminal value for the end of the venture capital financing period. The estimate of the terminal value is based on the forecast of the periods following the VC financed period.

For VC as well as e.g. IPO valuation the multiples or comparables analysis is the most popular method. The basis for the method is largely empirical. Normally both DCF analysis (absolute valuation) and multiples or comparables analysis (relative valuation) are performed in parallel.

3.5 Discounted Cash Flow Valuation

The characteristics stated given by Damodaran (2009) in section 3.2 above lead to difficulties in valuation in equity crowdfunding. This is true for both discounted cash flow (DCF) valuation as well as relative valuation i.e. valuation multiples. Valuation through discounted cash flow, which is theoretically the most optimal method, relies on estimates or educated guesses of the following factors (Damodaran, 2009), which are all difficult to estimate for start-ups: cash flows from existing assets, expected growth from both new investments and improved efficiency on existing assets, discount rates that emerge from the risk assessments of both the business and its equity, and assessment of when the firm will become a stable growth firm (allowing the estimation of the exit or the terminal value).

The basis for cash flow estimates in DCF for mature companies is often current and historical financial statements. For start-ups, this data is either non-existent or not representative of the future situation. Existing

assets represent only a small proportion of the future cash flows and thus of the overall value since most of their value comes from growth assets. In the absence of historical data on revenues and their growth, the basis for valuation is the (start-up's own) estimate of future revenues and future operating margins. It is not unusual that these may be heavily biased (Damodaran, 2009).

The discount rate used in the DCF analysis is typically based on the weighted average cost of capital (WACC) or in its absence it can be estimated by assessing the risk in a company and related beta of the equity (Damodaran, 2009). However, this assessment concentrates only on market risk, making the implicit assumption that investors in the company are well diversified and that firm-specific risk can be neglected. For start-ups, these assumptions are not often realistic.

3.6 Relative Valuation

As noted above, using the discounted cash flow model to valuate a start-up is challenging. Therefore, multiples or comparables are often used. They are not without problems themselves. However, this task is also made more difficult by the following factors.

All valuation multiples have a denominator which needs to be estimated for the future. Estimates for earnings before interest, taxes, depreciation, and amortization (EBITDA), earnings before interest and taxes (EBIT) or even relatively simpler revenue may be difficult to reach since they rely heavily on the rate and stage of growth. Calculating most multiples without positive earnings is also not possible. Even revenue estimates are not without problems for early-stage start-ups (Damodaran, 2009).

Relative valuation relies on comparison to known valuations of similar, comparable companies in the same sector. This is often difficult enough for more mature publicly traded companies, for start-ups the applicable market valuations of these companies are usually not known. More mature, publicly traded companies have very different risk, cash flow, and growth profiles even in the same sector or industry compared to the start-ups in question (Damodaran, 2009).

The high rate of failure in start-ups is not considered in any way when using valuation multiples. Relative valuation may at first glance appear

much easier than DCF analysis, but when the valuation problem is looked at more closely it becomes apparent that most of the challenges of DCF analysis remain also for relative valuation (Metrick and Yasuda, 2010).

Kim and Ritter (1999) also find multiples like Price/Earnings, Price/Sales, EV/Sales, and EV/EBITDA of comparable companies of only limited use in the valuation of IPOs if historical data is used instead of forecasts. The use of earnings forecasts improves the accuracy of the valuation, but younger companies are still challenging (Kim and Ritter, 1999). The following ways have been found to help with the accuracy: utilizing peers with similar profit and growth projections, utilizing enterprise-value multiples, and using forward-looking multiples (Koller et al., 2005). EBITDA based multiples have been shown to be more accurate than sales-based multiples. Multiples for companies with largely intangible assets are challenging possibly due to difficulties in estimating growth opportunities and other intangibles (Lie and Lie, 2002).

Fernández (2001) analysed the use of multiples in equity valuation (14 most popular multiples from 175 companies) and came to the basic conclusion that nearly always multiples have broad dispersion which leads to highly debatable valuation results. However, he found multiples to be useful in the second stage of the valuation i.e. comparing comparable firms using the multiples to gauge the valuation and identify differences between the firm valued and the benchmarks (Fernández, 2001).

3.7 Start-up Valuation in Equity Crowdfunding

The lack of collateral and the increased risk connected with the early stage of the business makes start-up entrepreneurs often unable to access sufficient debt financing. Typically, the initial investments are made by friends and family. Since friends and family often do not have access to sufficient funds, other sources of risk capital are needed. Traditionally they have been business angels and venture capitalists but more recently also crowdfunding as an alternative or additional means of funding as shown in figure 3.

The valuation of start-up companies is problematic as has been shown above. In practice, it is common to concentrate on fairly short-term estimates and to use a mix of intrinsic and relative valuations. The terminal

or exit value (value at the end of the forecast period) is often estimated based on exit multiples relying on known exits (mergers or acquisitions or initial public offerings) and the expected earnings or revenues for the timing of the planned exit. The equity value at the end of the forecast horizon and the cash flows until then are then discounted to the present at rates of return that are usually adjusted to take into account the risk in the business and the likelihood that the firm will not survive (Damodaran, 2009).

The enterprise value and the pre-money valuation it is based on are also extremely important for these multiples to be useful and therefore it is important to consider how that valuation was formulated and by whom. The valuations are often made by the companies themselves, but it is worthwhile to consider which factors were determinant in the process and who exactly did partake in it. Was the valuation entirely based on internal estimates or were outside experts or knowledge used and to what extent? It is also important to understand how the stage of the start-ups affects the choices of funding available to them and that crowdfunding is just one of the methods used by companies as they grow.

The valuation of the company has a clear impact on how large a share an investor is entitled to in return for their investment. This value is called the pre-money valuation. If company net debt is known, the enterprise value EV can be calculated, by adding the net debt to the pre-money valuation. The valuation multiples EV/EBITDA and EV/Sales can be calculated if EBITDA and Sales are known. These multiples are widely used in the finance industry to measure the value of the company. EV/EBITDA is used as a measure of cash flow available to the firm. EV/Sales is useful for companies with negative earnings, which is often the case with start-ups. The popularity of these multiples arises from the fact that they are capital structure-neutral (e.g. Harbula, 2009). Chastenet and Marion (2015) find the forward-looking EV/EBITDA to perform the best. They are therefore used the most by e.g. financial analysts, and M&A advisors, to identify the most relevant multiples within any industry-based peer group. More examples of the use of valuation multiples may be found in e.g. Henschke and Homburg (2009), Koller et al. (2005) and Liu et al. (Liu et al., 2002). Enterprise value multiples may be used to determine

whether a company is undervalued or overvalued compared to the reference. A low multiple signifies possible undervaluation whereas a high multiple signifies possible overvaluation. High valuation multiple may also signify that a larger part of expected earnings from the equity is expected to emerge further into the future.

The multiples are especially useful for benchmarking, but they are very specific to a certain industry and stage of company growth. In the case of start-ups or similar companies and projects, the cash flow, EBITDA, and Sales figures used may not exist or they are not representative of those expected even in the medium term. In the Finnish equity crowdfunding context during 2012-2017, nearly a third of the companies did not have any revenue during the previous year to the crowdfunding campaign and only 16 out of 87 turned a profit (Herrala, 2018a). According to a report on the Finnish crowdfunding market 2012-2017 (Repo Research, 2018), the Price/Sales valuation multiples (N.B. the difference between price and enterprise value) of successful campaigns have been decreasing from *ca.* 11 in 2013 to *ca.* 9 in 2017.

Since the present values (of EBITDA and Sales) are not representative (or always available), projected values are used. Naturally, this is the case for established companies as well since the whole idea is to predict future earnings, but in the case of start-ups, the uncertainty is considerably higher. Most companies on the Invesdor.com portal provide sufficient financial information and projections so that it is possible to calculate projected EV/EBITDA and EV/Sales multiples for some years into the future from the start of the crowdfunding campaign.

4. HYPOTHESES DEVELOPMENT

This chapter shortly summarizes the research questions and the related hypotheses as well as the relevant theory.

4.1 Valuation Multiples as Predictors of Equity Crowdfunding Success

The first research question (RQ1) is the following:

RQ1*: Do the forecast values of either EV/EBITDA or EV/Sales multiples of some reasonable time frame correlate with campaign success?*

The relevance of this research question arose from the need to have a simple figure such as the valuation multiples are which would correlate with campaign success and indicate crowdfunding campaign quality to potential investors in a way similar to how figures such as P/E are used for publicly traded stocks. Such a metric would be useful for both the platform in screening the companies applying for an equity crowdfunding campaign and the companies themselves when making their valuation as well as for the potential investors when making their investment decision.

The hypotheses related to this research question are the following:

H1a: *Forecast values of EV/EBITDA multiple are relevant predictors of campaign success for a company seeking funding through equity crowdfunding in general.*

H1b: *Forecast values of EV/Sales multiple are relevant predictors of campaign success for a company seeking funding through equity crowdfunding in general.*

For hypotheses 1a or 1b to be true, the relevant multiples of companies with successful campaigns should be inherently and clearly better than

those with unsuccessful campaigns. Thus, a cut-off point would exist separating the successful campaigns from the unsuccessful.

Typically, when using the multiples valuation method, company valuations are based on multiples from closely matched benchmarks. In light of the theory and practical application of the multiples, it appears unlikely that the difference between successful and unsuccessful campaigns would be so clear, and, therefore, a second hypothesis is formulated:

H2a: *Forecast values of EV/EBITDA multiple are relevant predictors of campaign success for companies seeking funding through equity crowdfunding within a given industry or field.*

H2b: *Forecast values of EV/Sales multiple are relevant predictors of campaign success for companies seeking funding through equity crowdfunding within a given industry or field.*

While the stage of the company should be relevant for this decision, Lukkarinen et al. (2016) find that in the subsample of the sample used in the present study the stage of the company was not relevant for campaign success. Also, because campaign stage ratings were available only for that subsample, it was estimated that all (or most) of the companies seeking funding through equity crowdfunding are at a very similar stage with each other. Thus, the stage of the companies was left outside the scope of this study.

Based on the literature reviewed in the previous chapters, hypotheses 2a and 2b could be true through several mechanisms. Firstly, the forecast values of either EV/EBITDA or EV/Sales multiples predict campaign success, because they correlate well with other signals of high quality. This may be so clear that the equity crowdfunding investors, in general, prefer these campaigns over others. Alternatively, the so-called sophisticated investors may use these multiples or the underlying data to choose their preferred investments and the signalling value of their investments is sufficient to drive campaign success.

Several assumptions are made here. First, it is assumed that equity crowdfunding investors, in general, are not knowledgeable in the use of these valuation multiples. Second, if any of the investors are using the multiples or the underlying data, it is not necessary for these to be accu-

rate i.e. based on valid and reasonable evaluations and realistic assumptions on growth and profitability. They just need to be in line with other signals given by the campaign. For investors, it is impossible or very difficult to assess the validity of the EBITDA or Sales forecasts, but discrepancies or over-optimistic predictions are easier to detect and that needs to be factored into the valuation, which in the end is being judged in the crowdfunding campaign. Thus, the objectivity of both the valuation (and thus the EV) and the EBITDA and Sales forecasts are not strictly required, but the consistency of these with each other is. But it is clear that there is an obvious difference between valuation multiples based on actual enterprise values and EBITDA and Sales figures and those based on the company's own valuation and their forecasts of EBITDA and Sales. This means that valuation multiples derived from benchmarks from other contexts most probably do not translate fully into the equity crowdfunding contexts.

It is also possible that the entrepreneurs use valuation multiples in some form to form their valuations. This would be the correct and justifiable way of using the valuation multiples. This would lead to more fairly valued campaigns have higher success rates. Alternatively, they use the valuation multiples to form their Sales and EBITDA forecasts to justify their high valuations. This would be an incorrect way of using the multiples.

In any case, the usefulness of the valuation multiples relies on their signal to noise -ratio. If their signal value is high, they should predict campaign success over a fairly large range of company maturity in an industry or field which is not too narrowly specified. On the other hand, if the noise is high, the usefulness of these valuation multiples is limited to comparisons between just a few very closely matching benchmarks and thus, while still useful, not really a good predictor of campaign success.

4.2 Formation of Company Valuation in Equity Crowdfunding

The second research question (RQ2) can be stated in the following way:

RQ2*: How do the companies seeking funding through equity crowdfunding campaigns arrive at their pre-money valuations?*

The hypotheses related to the second research question are the following:

H3: *The pre-money valuations of companies seeking funding through equity crowdfunding are based on in-depth analysis of expected profits through a process more or less similar to the VC method (combination of DCF and relative valuations) based on analysis of such factors as team, markets, concept, scalability, stage of development and terms of investment.*

The following hypothesis (H4) is presented as an alternative hypothesis to H3.

H4: *The pre-money valuations of companies seeking funding through equity crowdfunding are based on both the sunk costs and the estimated project cost so as to cover those exactly or by some target margin.*

A third alternative hypothesis (H5) is the following:

H5: *The pre-money valuations of companies seeking funding through equity crowdfunding are based on benchmarking against other comparable present or past companies.*

The assumption here is that the entrepreneurs are mainly rational actors and that the pre-money valuations are based mainly on the expected earnings and thus that hypothesis 3 will hold. If the potential equity profits of the business venture were less in comparison to the salary earnings of the entrepreneurs working themselves in the company, hypothesis 4 could hold and the main motivation for the entrepreneurs could then be to seek operating capital instead of investment capital. The theoretical basis for hypothesis 4 is quite slim as the cost approach is not really used in the valuation of companies. It is based on both one of the first interviews as well as the use of a similar approach in e.g. commercial real estate. If hypothesis 5 were to be true, it would mean that the valuation would be completed entirely through relative valuation methods described in section 3.6 above. Depending on the number and type of companies selected for benchmarking this could be interpreted as either a sign of a small degree of intellectual laziness on the entrepreneur's part or clear acknowledgement of the difficulty of estimating the future cash flows and related uncertainties or high level of confidence in their own entrepreneurial experience.

To summarize the purpose and aim of the present study, which is two-fold. First, to see whether the forecast values of EV/EBITDA or EV/sales multiples are of any use in predicting equity crowdfunding campaign success. It could be useful as a general predictor or within a more limited set of companies. In the worst case these multiples would only be useful within a very limited set of very close benchmarks, in which case it could not be used as a good predictor of campaign success, but only as one tool for the pre-money valuation of the company planning an equity crowdfunding campaign. In this case, the correlation between the valuation multiples and the measures of campaign success would not be clear.

The second aim is to find out how the pre-money valuations of companies seeking funding through equity crowdfunding campaigns are formed since the proposed usefulness relies to a large extent on them being based on the validity of these valuations. This assumes the use of a VC method or similar. The use of more general industry averages or more anecdotal experience-based evidence (hypothesis 5) or just a means to get operating capital (hypothesis 4) would probably make the valuation multiples less useful.

5. DATA AND METHODS

This chapter presents the equity crowdfunding process at Invesdor.com and the data used in the present study. The description below describes the process as it was during the time when the equity crowdfunding campaigns in question were carried out and therefore represents the situation as it was prior to 2016. The equity crowdfunding process may well have evolved somewhat since then.

The Invesdor.com portal has been in operation since 2012. Invesdor Oy was first in the European equity crowdfunding field to hold a MiFID-level (Markets in Financial Instruments Directive) investment services license to operate across the European Economic Area (EEA). During the timeframe in question, Invesdor was the leading equity crowdfunding platform in Finland with a close to 80% market share (Lasrado and Lugmayr, 2014).

Like most equity crowdfunding platforms, Invesdor operates under the "all-or-nothing" model. As is typical of equity crowdfunding, most of the investors participating on the platform are one-time investors. 86% of the investors at the platform have invested in only one target company (Lukkarinen et al., 2016). This leaves under one in seven in the minority group of recurring investors. The companies seeking funding on the platform represent a wide range of industries and, while various stages of maturity are represented, a large majority of the companies are start-ups. The investors also come from more than 70 countries (Invesdor Finland, 2017).

5.1 Investment Process at Invesdor

A generalized depiction of the main steps making up the crowdfunding process for a campaign at the Invesdor platform is shown in figure 9. As indicated in the figure, a large majority of applications for an equity crowdfunding campaign are rejected for not fulfilling the set of criteria

required to collect equity crowdfunding. This is evidence of the due diligence carried out by the Invesdor platform.

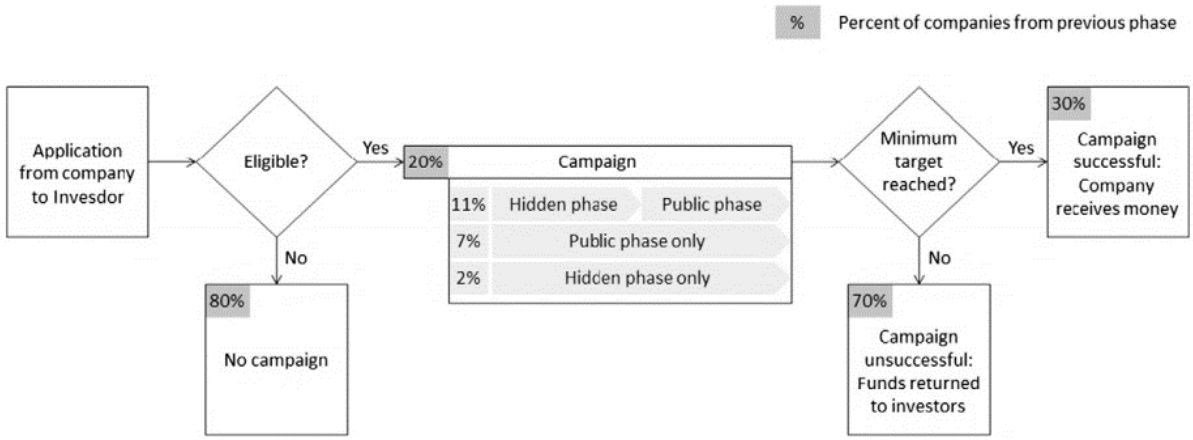

Figure 9. High-level crowdfunding process at Invesdor (Lukkarinen et al., 2016).

The actual campaigns typically consist of two phases, hidden and public. During the hidden phase, the campaign pitch is only accessible to the company's own network, Investor's partners, and some preferred investors. Access is on an invitation-only basis. This part of the campaign is important not only for the funds collected but also for the strong signal such commitment sends to the other investors as discussed above.

During the public phase, the campaign pitch is visible on Invesdor.com website and open for any interested parties. Information included on the website are minimum and maximum of the funding sought, the equity share (minimum and maximum) offered for sale, price per share and the minimum investment in a number of shares and especially the pre-money valuation. To further strengthen the signalling power of the investments, they are visible to anyone registered to the platform (date of the investment and a pseudonym of the funder). The predicted revenue and EBITDA are available for 1-5 years into the future for some campaigns (more often in the later part of the dataset indicating some development in the equity crowdfunding process). Similarly, the financial statements necessary for the calculation of the enterprise value are not available for all campaigns in the dataset and those that are, are of varying quality. In this as with the Sales and EBITDA forecasts, the quality of the financial statements tends to improve during the time period from which the dataset is from. Most importantly for the present topic, valuation multiples (EV/Sales, EV/EBITDA or any other multiple) are not

available for the investor readily and even an informed investor might have trouble locating all the inputs for these calculations.

Both the hidden and the public phases are optional as 35% of the campaigns opted not to have a hidden phase and 10% of them only had the hidden phase. It may be that the publicity generated during the crowdfunding campaign was seen as disadvantageous by these companies due to issues related to the public exposure and its effects on their business or financing prospects in the future, but they nevertheless saw the crowdfunding platform as an advantageous venue to solicit equity investors. In general, only approximately thirty per cent of all campaigns are successful in reaching their target, while the rest, 70%, fail. If the campaign fails in reaching the target, all the funds are returned to the funders.

5.2 Dataset

The dataset used in the present study has been provided by Invesdor Oy. The data is similar to the data used by Lukkarinen et al. (2016) but the observation period has been extended and thus 103 campaigns are included instead of 60. In order to study research question 1, the dataset has been amended with data describing the financial situation of the company provided by them on the Invesdor platform. This data was retrieved for the relevant campaigns from the Invesdor.com site and used for the calculation of the enterprise values of the companies.

In order to study research question 2, a survey consisting of telephone interviews of the persons involved in a selected group of crowdfunding campaigns from the dataset above was also conducted. The interviews were as open format as possible but aimed at finding an answer to one rather specific question. The data desired constituted of the weights for the four general factors affecting the pre-money valuation decision of the company. These factors were:

1) "In-depth analysis of expected profits (Team, Markets, Concept, Scalability, Stage, Investment terms)",
2) Sunk cost / Project cost estimate,
3) "Benchmark against other comparable Companies / General experience of the market" and

4) Other.

These factors are described in greater detail below in section 5.3. If these percentages could not be derived through an open format discussion on the general topic of pre-money valuation, then the categories were introduced, and the interview was carried out in a more semi-structured fashion.

5.3 Interview Procedure

The interview protocol used is similar to ones used in previous studies (e.g. Ordanini et al., 2011). The main intention of the interviews was to discuss the main topics relevant to the research questions in a brief and concise manner, while also leaving some room for both the respondent and the researcher to extend the discussion to other relevant issues if such may arise. The questions were set up in a way to allow the respondents some degree of interpretation of the qualitative inquiries but as the responses sought were quantitative, i.e. precise values in percentages, this was limited. The aim of the interview was to get a description of the factors on which the valuation decision was based in the form of weights in percentage summing up to 100%.

The in-depth analysis of expected profits was the factor on which the valuation decision could be based that was closed to the methods used by finance professionals like venture capital and business angel investors. It takes into consideration such things as the composition of the team, markets in which the company competes and into which it plans to enter, the product or service concept, scalability of the business model, stage of development of the company and its products, and naturally the terms of the investment in order to estimate the expected returns on investment and the risks involved. The suggested method is closely related to the one described by the FiBAN (Etula, 2015). Some of the interviewees actually mentioned the FiBAN framework as a tool they had used, and others acknowledged using it when prompted. Also, some companies noted that the fact that the possibility of a business angel and venture capital financing had influenced their valuation.

Valuation based on the sunk cost/project cost estimate factor was as an idea closer to the cost-plus model of pricing goods or services. It is clearly

a more inward-looking approach for the company. It assumed that the entrepreneurs consider the amount of their funding already used for the company or base their valuation on the amount of funding required to complete a particular project or cover the running costs of the start-up for some particular amount of time. As such, it was very much need-based and, in the extreme, formed the valuation based on balancing the need of the project and the proportion of the enterprise the entrepreneurs were willing to part with in order to get that covered. As such it could be argued as being the least in line with the finance literature.

Benchmarking against other comparable companies or general prior experience of the start-up market was the factor of valuation which relied mostly on the entrepreneur's own or other stakeholders prior experience to evaluate the company in relation to the value of some previous start-up. It should be noted that the difference between this and factor 1 (in-depth analysis of expected profits) is that that this factor is benchmarking directly against the valuation of other suitable companies possibly even using suitable valuation multiples. This method has been used in the valuation of e.g. IPOs as noted in the previous chapter. Factor 1 (in-depth analysis of expected profits), on the other hand, also utilizes benchmarking and other forms of comparative methods, but only in so far as to estimate the relevant future free cash flows which can be the discounted into the present. So, strictly speaking, this factor 3 should be understood as backwards-looking whereas factor 1 is forward-looking. The use of forward-looking valuation multiples (as in the case of the present study) is conceptually somewhere in between these two.

Due to the open or semi-structured and iterative nature of this interview process, the wording of the questions varied slightly from interview to interview and some follow-up questions were added to address any relevant new issues that came up. In this way, if the framework did not cover the main factors, and especially if the "other" factor was large, further clarification was sought. However, in the end, it was used relatively seldom.

It should be also noted that the results would probably have been more reliable if more structured way for deriving these weights would have been used. For example, the Analytic Hierarchy Process (AHP) (Saaty, 1977) would have undoubtedly given better estimates for the weights of

the different factors. This would, however, have been clearly more structured interview and as a result, two aspects of the method used would have been lost. First, some of the interviews were quite short in time due to the interviewees' time constraints. A more structured method could have thus decreased the number of interviews which is small as it is. Second, a more structured interview method could have negatively affected the amount of additional information gained as a result of the interviews. Third, a method such as the AHP would have made it more difficult to fine-tune the factors in any way after the series of interviews had commenced. If a follow-up study or similar is concluded later, the use of a method such as the AHP or conjoint analysis should be considered.

5.4 Measures of Campaigns Success (dependent variables)

As discussed above, the motivations for equity crowdfunding campaigns vary from company to company and from campaign to campaign. Funding is typically, but not always, the most important goal. Other motivations may include goals such as market testing, relationship building, collecting feedback, as well as promotion and marketing (Belleflamme et al., 2014). To reflect these goals the success measures for equity crowdfunding campaigns include the number of investors as well as the amount raised (both actual and percentage of target). These are partially the same measures of campaigns success used by e.g. Lukkarinen et al. (2016). The analysis is performed for all dependent variables and the natural logarithms of these dependent variables.

5.4.1 Number of Investors

The total number of investors willing to invest in the campaign is a clear indication of the amount of interest it was successful in generating. Both successful and failed campaigns are considered since campaign success depends also on the target level set by the company and not only on the interest generated by the campaign. The number of investors is a measure of the general interest in the campaign and it fails to consider the importance of the so-called strategic or sophisticated investors who make

considerably larger investments and, thus, have been shown to be important for campaign success. Nevertheless, it is a good measure of the success of the campaign in generating interest among investors.

5.4.2 Total Amount Raised

The amount of funding raised (or pledged) by the crowdfunding campaign is a natural indicator of campaign success since funding is a major, if not the only, reason for having a crowdfunding campaign.

5.4.3 Percentages of Minimum and Maximum Targets Raised

As the total amount of funding raised by the crowdfunding campaign does not consider the actual definite requirement of the company also the percentages of the minimum and maximum targets raised are considered as indicators of campaign success.

Again, the final amount is influenced by not only the campaign but also the campaign target level. Therefore, both the actual amount and the percentage of target raised are considered.

5.5 Independent Variables

For the independent variables, EV/EBITDA and EV/Sales were selected based on their use in benchmarking VC and BA finance, and IPOs. As discussed earlier, the crucial property of EV/EBITDA and EV/Sales multiples is their capital structure-neutrality (e.g. Harbula, 2009). Equity value multiples (such as Price/Earnings, Price/Book, and Price/Cash flow) multiples exist, but they are typically used for more mature publicly traded companies. Also, when the equity value is used then the divisor needs to be considered after interests in the which makes them less useful for the present study.

Also, the bases of valuation discussed above were selected based on the hypotheses formulated earlier.

5.5.1 Valuation Multiples

For calculating the EV/EBITDA and EV/Sales projections, the EBITDA and Sales projections provided by the companies in the campaign pitch

materials were used as given. Only the timings were normalized to allow for different timings of the campaigns and thus e.g. EV/S3 figure would be the enterprise value divided by the Sales figure three years into the future from the time of the campaign.

The enterprise values were calculated based on the pre-money valuations provided by the companies and amounts of interest-bearing debt and cash reported by the companies in the financial statements they had provided as part of the campaign material. The enterprise value of the company was calculated by adding the amount of net debt (interest-bearing debt – cash) to the pre-money valuation of the company.

5.5.2 Basis of Valuation

The motives and reasons for holding an equity crowdfunding campaign apart from the funding were discussed above. Also, the approaches taken by companies towards valuation prior to the crowdfunding campaign differ from company to company. The differences may be indicative of the type of start-up company in question as well as the stage at which it is in the financing cycle.

Four different categories of the basis for valuation were established and the companies' motivations were estimated as a combination of these in percentage so that the total for each company is always 100%. If the basis for valuation used by the company was clear without the categories being introduced, then they were not, so as to not influence the response.

These include:

1. In-depth analysis of expected profits (team, markets, concept, scalability, stage, investment terms),
2. Sunk cost/project cost estimate,
3. Benchmark against other comparable companies /general experience of the market", and
4. Other.

5.6 Control Variables

A control variable for the industry was used in the present study. This is a categorical variable and it was available in the dataset. A stage control variable was also considered but rejected based on lack of availability and the fact that Lukkarinen et al. (2016) found that it was not a significant predictor of campaign success. It was therefore assumed that the majority of the ventures seeking funding through equity crowdfunding campaigns are at a similar (start-up) stage.

The industry variable is the category into which the company seeking funding through the crowdfunding campaign belonged. These were based on a classification system used at Invesdor. The existing categories were the following in order of importance: Software & Technology, Lifestyle, Restaurants, Bio, Consumer goods, Arts & Design, Health & Fitness, Sport & Leisure, Manufacturing and Other. Only Software & Technology, Lifestyle, and Restaurants were large enough to be considered separately in this study. The appropriate dummy variables were created for these categories.

6. RESULTS

This chapter presents the results of the empirical parts of this study.

6.1 Descriptive Statistics

In this section, the different subsets of the dataset as well as the variables calculated for the present study are described.

6.1.1 Campaign Dataset Used for Valuation Multiples

The dataset from Invesdor Oy consists of the full set of 103 campaigns conducted through the Invesdor platform between May 2012 and January 2016. Thus, the data used is an expanded dataset compared to Lukkarinen et al. (2016) who used a 60-campaign dataset ending in September 2014. The data is treated as cross-sectional. Of these campaigns, 45 (43.7%) were successful. This is somewhat higher than the ~30% reported by Lukkarinen et al. (2016) (see figure 9).

The average number of investors per campaign overall was 78.4 (166 for the successful campaigns and 10.3 for the failed campaigns). The median number of investors was 16, thus the number of investors was highly skewed. The number of investors for the successful campaigns range from 3 to 1 743, while the average investment range is from 208 € to 22 847 €. The range of raised capital for the successful campaigns was from 13 800 € to 1 008 385 € with an average of 203 520 €.

Of all the campaigns, 85 had provided the Sales and/or EBITDA forecasts for at least some years and 56 had sufficient balance sheet data so that the enterprise value (EV) of these companies could be calculated. Thus, the number of companies for which both of these and thus the valuation multiples were available was 55, which represents 53% of the orig-

inal sample. The sample size would have been considerably larger if equity value multiples were used, but, due to the reasons presented in 5.5 above (lack of information on interest payments on existing debt) the enterprise value multiples were considered the preferred method.

Due to the nature of the valuation multiples as tools suitable for benchmarking, three subsets of the original data were selected for further detailed analysis. These consist of 46 campaigns in the Software & Technology category, 21 campaigns in the Lifestyle category as well as all 12 campaigns in the Restaurants category. These 79 campaigns constitute 77% of the original sample. Of these only 22, 11 and 7 (for Software & Technology, Lifestyle and Restaurants categories respectively) had provided the required Sales and EBITDA projections as well as the required balance sheets from which to assess the amount of interest-bearing debt and cash for calculating the enterprise values. These constitute 39% of the original sample and 71% of the companies with valuation multiples available. These three categories were selected because they form three sufficiently large but also significantly different crowdfunding campaign categories. Especially, Software & Technology and Restaurants categories represented for the most part companies which were quite similar to others within the same category. The success rates of the Software & Technology and Restaurants category campaigns were quite similar as well, as 41% of Software & Technology category campaigns, 33% of Lifestyle category campaigns and 42% of the Restaurants category campaigns were successful. This is higher than the success rates reported for the 43 first Invesdor crowdfunding campaigns (23.3%) by Lasrado and Lugmayr (2014) or by Lukkarinen et al. (2016) (30% success rate). This increase in the fraction of successful campaigns may be interpreted as publics increased interest and participation in equity crowdfunding and/or Invesdor's more stringent screening and vetting practices which have increased the quality of crowdfunding campaigns on the platform over time.

The crowdfunding campaigns in the three different categories were of slightly different sizes. The Software & Technology category campaigns averaged 119.2 investors per campaign while Lifestyle and Restaurant categories averaged 132.2 and 85.9, respectively. The widest range of investors was in was Software & Technology category with a range from 12

to 1 743, while Lifestyle and Restaurant categories had narrower ranges with ranges from 36 to 787 and from 163 to 192, respectively. The average investment ranges per campaign differed as well, as these ranges were from 208.26 € to 7 038.60 € for the Software & Technology category, from 440.14 € to 2 283.33 € for the Lifestyle category, and from 530.92 € to 963.41 € for the Restaurant category. Summaries of these statistics are presented in table 3, table 4, table 5 and table 6. It should be noted that the campaigns, for which the valuation multiples were available, are clearly not the same on average as the whole sample population as can be seen from the summaries below.

6.1.2 Campaign Dataset Used for Pre-money Valuation

For the purpose of analysing the approaches taken by the companies towards making their pre-money valuation (prior to the crowdfunding campaign) a series of telephone interviews was conducted for two subsets of the full campaign dataset. These consisted of 46 campaigns in the Software & Technology category and 12 campaigns in the Restaurants category. These are the same subsets as used in the valuation multiple -part of this study. The Lifestyle category was rejected due to an expected lack of inner consistency. The given contact persons of all these campaigns were telephoned and a short telephone interview was conducted with those who were reached and who agreed to participate. The number of interviewed campaigns was 25 and 6 for Software & Technology and Restaurants categories respectively which was 54% and 50% of the entire category subsets. The number of interviews available in the Restaurants category is rather small and implies a rather high margin of error even at lower confidence levels.

The campaigns which agreed to an interview had on the average 17, and 96 investors for the Software & Technology and Restaurant categories respectively and on average the total investments were 28 964 € and 124 280 € respectively. Thus, it should be noted again that the samples differ quite much from each other, both between categories as well as between the different subsets used for the valuation multiples as well as for pre-money valuation. Summaries of these statistics are presented in table 3, table 4, table 5 and table 6. It is clear from the means and medians

presented in the tables below that the data describing campaign success is highly skewed.

Table 3. Campaign summary statistics for the total amount raised.

Total raised	All	Software & Technology			Lifestyle		Restaurants		
in 1 000 €		All	Multiples	Interview	All	Multiples	All	Multiples	Interview
Count	103	45	22	25	21	11	12	7	6
Mean	101.4	76.6	140.4	29.0	105.7	137.7	88.8	92.6	124.3
Median	25.2	9.1	45.3	6.9	20.2	18.5	31.3	86.5	95.4
Min	0.0	0.0	0.0	0.0	0.0	0.0	14.5	14.5	14.5
Max	1 008.4	999.5	999.5	140.2	810.8	810.8	243.2	173.0	243.2
Mean if Fail	14.8	4.6	5.1	4.6	29.2	9.3	39.0	46.0	14.5
Mean if Success	203.5	179.0	234.0	72.3	258.8	291.8	138.7	139.2	151.7
Min if Success	13.8	13.8	25.4	21.7	45.6	45.6	32.8	86.5	32.8
Max if Success	1 008.4	999.5	999.5	140.2	810.8	810.8	243.2	173.0	243.2

Multiples – Campaigns for which required data is available for calculating valuation multiples
Interview – Campaigns for which an interview was conducted

Table 4. Campaign summary statistics for the number of investors.

Investors	All	Software & Technology			Lifestyle		Restaurants		
		All	Multiples	Interview	All	Multiples	All	Multiples	Interview
Count	103	46	22	25	21	11	12	7	6
Mean	78	67	119	17	80	132	78	86	96
Median	16	10	25	12	18	32	33	32	99
Min	0	0	0	0	0	0	2	9	2
Max	1 743	1 743	1 743	83	787	787	192	192	192
Mean if Fail	10	5	5	7	13	11	30	21	8
Mean if Success	166	154	198	35	216	278	145	173	141
Min if Success	3	8	12	12	36	36	34	163	34
Max if Success	1 743	1 743	1 743	83	787	787	192	192	192

Multiples – Campaigns for which required data is available for calculating valuation multiples
Interview – Campaigns for which an interview was conducted

Table 5. Campaign summary statistics for the percentage of the minimum target raised.

% of min raised	All	Software & Technology			Lifestyle		Restaurants		
		All	Multiples	Interview	All	Multiples	All	Multiples	Interview
Count	103	46	22	25	21	11	12	7	6
Mean	96 %	78 %	124 %	63 %	65 %	79 %	77 %	89 %	91 %
Median	30 %	18 %	114 %	17 %	29 %	39 %	31 %	35 %	68 %
Min	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Max	1008 %	388 %	388 %	280 %	217 %	217 %	277 %	277 %	231 %
Mean if Fail	12 %	9 %	9 %	9 %	17 %	11 %	16 %	22 %	6 %
Mean if Success	205 %	177 %	203 %	157 %	161 %	161 %	162 %	178 %	133 %
Min if Success	14 %	55 %	102 %	102 %	103 %	103 %	27 %	27 %	27 %
Max if Success	1008 %	388 %	388 %	280 %	217 %	217 %	277 %	277 %	231 %

Multiples – Campaigns for which required data is available for calculating valuation multiples
Interview – Campaigns for which an interview was conducted

Table 6. Campaign summary statistics for the percentage of the maximum target raised.

% of max raised	All	Software & Technology			Lifestyle		Restaurants		
		All	Multiples	Interview	All	Multiples	All	Multiples	Interview
Count	103	46	22	25	21	11	12	7	6
Mean	36 %	29 %	45 %	22 %	28 %	34 %	25 %	26 %	30 %
Median	11 %	6 %	31 %	6 %	12 %	12 %	9 %	14 %	9 %
Min	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Max	336 %	145 %	145 %	120 %	87 %	87 %	95 %	69 %	95 %
Mean if Fail	6 %	4 %	5 %	5 %	8 %	4 %	8 %	11 %	4 %
Mean if Success	75 %	65 %	72 %	52 %	68 %	69 %	48 %	46 %	43 %
Min if Success	6 %	6 %	18 %	6 %	46 %	46 %	8 %	11 %	8 %
Max if Success	336 %	145 %	145 %	120 %	87 %	87 %	95 %	69 %	95 %

Multiples – Campaigns for which required data is available for calculating valuation multiples
Interview – Campaigns for which an interview was conducted

6.1.3 Calculated Valuation Multiples

Software & Technology, Lifestyle and Restaurants categories were selected for further study because they form three sufficiently large but also significantly different categories of crowdfunding campaigns. Overall, the pre-money valuations ranged from 90 k€ to 24 400 k€ with an average of 2 165 k€. With the net debts given in the balance sheets provided in the campaign information packages, the calculated enterprise values ranged from 90 k€ to 31 715 k€ with a mean of 2 138 k€.

For the Software & Technology category, the pre-money valuations ranged from 304 k€ to 8 340 k€ with an average of 2 044 k€. With the net debts given in the balance sheets provided in the campaign information packages, the calculated enterprise values ranged from 239 k€ to 9 676 k€ with a mean of 2 145 k€. For the Restaurant category, the pre-money valuations ranged from 93 k€ to 2 434 k€ with an average of 1 053 k€. The calculated enterprise values ranged from 299 k€ to 3 365 k€ with a mean of 1 586 k€. And for the Lifestyle category, the pre-money valuations ranged from 90 k€ to 2 500 k€ with an average of 1 351 k€ and the calculated enterprise values ranging from 90 k€ to 3 823 k€ with a mean of 1 582 k€. This makes these two categories quite similar, but they are differently distributed as the median of the Restaurant category is 600 k€ and the median of the Lifestyle category is 1 750 k€.

To estimate if the valuation multiples, especially the EV/EBITDA values, make sense one possible approach is to consider for example EV/EBITDA4 in relation to a four-year delayed perpetuity. In such a case

the arbitrary value of EV/EBITDA4 = 1 is equivalent to interest rate of 32.47%, EV/EBITDA4 = 5 is equivalent to interest rate of 12.49% and EV/EBITDA4 = 10 is equivalent to interest rate of 7.49%. If the perpetuity was assumed to be growing at e.g. 5% the EV/EBITDA4 = 1 is equivalent to interest rate of 35.06%, EV/EBITDA4 = 5 is equivalent to interest rate of 16.03% and EV/EBITDA4 = 10 is equivalent to interest rate of 11.48%. The mean EV/EBITDA4 (2.462) is equivalent to an interest rate of 19.75% without growth and to an interest rate of 22.84% with 5% growth. The median EV/EBITDA4 (1.258) is equivalent to an interest rate of 28.84% without growth and to an interest rate of 31.55% with 5% growth. The smallest EV/EBITDA4 value of 0.031 is equivalent to an interest rate of over 125%. Typical returns on investment expected by venture capital are over 20%, sometimes between 30 and 50%, so as ballpark figures, the range of valuation multiples are quite reasonable.

Also, if compared to the closest comparative reported industry means (Fernández, 2001), the median EV/Sales1-4 which range from 0.366 to 5 is in the same ballpark as the total market mean of 2.6 and the EV/EBITDA1-4 which range from 1.258 to 13.9 are in the same ballpark as total market mean 9.6. Similarly, The Software & Technology category EV/Sales which range from 0.155 to 16 is in the same ballpark as the Computer Software & Services mean of 7.1 and the EV/EBITDA1-4 which range from 0.351 to 34.1 are in the same ballpark as Computer Software & Services mean 25.3. The comparison above was made between medians for the dataset and the means for the reported industry values in order to take into account the larger weight of outliers in the dataset under examination.

A summary of these statistics and the summary statistics of the calculated valuation multiples EV/S1–4 and EV/EBITDA1–4 are shown in table 7, table 8, table 9 and table 10. It is clear from the means and medians presented in the tables below that both the EV/EBITDA and EV/S datasets are highly skewed.

Table 7. Summary statistics for the independent variables and their factors for all the campaigns.

ALL	Pre MV [k€]	Net debt [k€]	EV [k€]	EV/S1	EV/S2	EV/S3	EV/S4	EV/EBITDA1	EV/EBITDA2	EV/EBITDA3	EV/EBITDA4
Count	55	55	55	55	55	55	55	55	55	55	55
Mean	2 165	231	2 138	2.94E+5	4.397	2.472	0.717	1.50E+6	5.68E+5	15.264	2.462
Median	1 185	29	1 352	5	1.442	0.527	0.366	13.910	6.030	2.625	1.258
Min	90	-1 594	90	0	0.060	0.024	0.022	1.871	0.444	0.126	0.031
Max	24 412	7 304	31 715	9.0E+6	128.6	85.714	5.018	2.50E+7	2.50E+7	562.5	17.8
Mean if Fail	1 103	111	1 214	6.25E+5	1.658	0.664	0.388	9.38E+5	20.313	2.511	1.564
Mean if Success	3 022	327	3 349	21	6.843	4.086	1.045	1.99E+5	1.09E+6	27.073	3.359
Min if Success	90	-1 594	90	0	0.060	0.024	0.022	1.871	0.444	0.126	0.031
Max if Success	24 412	7 304	31 715	257	128.6	85.714	5.018	2.50E+7	2.50E+7	562.5	17.8

Table 8. Summary statistics for the independent variables and their factors for the Software & Technology -campaigns

Software & Technology	Pre MV [k€]	Net debt [k€]	EV [k€]	EV/S1	EV/S2	EV/S3	EV/S4	EV/EBITDA1	EV/EBITDA2	EV/EBITDA3	EV/EBITDA4
Count	22	22	22	22	22	22	22	22	22	22	22
Mean	2 044	101	2 145	6.80E+5	2.460	0.711	0.494	857 184	11.739	2.644	2.019
Median	1 451	24	1 457	16	1.776	0.411	0.155	34.148	6.086	0.798	0.351
Min	304	-286	239	0	0.060	0.024	0.022	1.871	0.444	0.126	0.031
Max	8 339	1 336	9 676	9.0E+6	10.643	2.990	1.935	6.0E+6	105.536	17.760	17.760
Mean if Fail	1 408	81	1 489	1.67E+6	1.669	0.464	0.179	2.0E+6	6.323	1.112	0.405
Mean if Success	2 485	114	2 599	21	3.053	0.897	0.740	54.432	16.072	3.792	3.274
Min if Success	304	-286	239	0	0.060	0.024	0.022	1.871	0.444	0.126	0.031
Max if Success	8 339	1 336	9 676	110	10.643	2.990	1.935	177.596	105.536	17.760	17.760

Table 9. Summary statistics for the independent variables and their factors for the Restaurants -campaigns

Restaurants	Pre MV [k€]	Net debt [k€]	EV [k€]	EV/S1	EV/S2	EV/S3	EV/S4	EV/EBITDA1	EV/EBITDA2	EV/EBITDA3	EV/EBITDA4
Count	7	7	7	7	7	7	7	7	7	7	7
Mean	1 053	150	1 586	3	1.778	1.308	0.951	13	20.605	5.748	4.571
Median	600	0	600	3	1.368	1.097	0.852	13.143	7.207	5.833	4.922
Min	93	-431	299	0	0.301	0.210	0.162	8.791	5.310	2.963	2.055
Max	2 434	931	3 365	5	3.667	2.552	2.033	15	88.553	9.452	5.747
Mean if Fail	850	284	1 135	3	1.735	1.271	0.853	14	27.236	6.196	5.295
Mean if Success	1 324	-30	1 294	3	1.866	1.381	1.097	11.351	7.342	4.851	3.485
Min if Success	600	-431	600	0	0.301	0.210	0.162	8.791	5.310	2.963	2.055
Max if Success	2 372	341	1 940	5	3.430	2.552	2.033	13.910	9.375	6.738	4.916

Table 10. Summary statistics for the independent variables and their factors for the Lifestyle -campaigns

Lifestyle	Pre MV [k€]	Net debt [k€]	EV [k€]	EV/S1	EV/S2	EV/S3	EV/S4	EV/EBITDA1	EV/EBITDA2	EV/EBITDA3	EV/EBITDA4
Count	11	11	11	11	11	11	11	11	11	11	11
Mean	1 351	232	1 582	46.0	12.962	8.543	0.976	855 645	140.689	57.304	1.674
Median	1 750	45.1	1 750	4.11	1.769	0.803	0.704	13.187	5.918	2.946	1.623
Min	90.0	-0.729	90.0	0.778	0.259	0.108	0.037	2.592	0.778	0.251	0.081
Max	2 500	1 323	3 823	257	128.571	85.714	3.651	3 378 200	1 000	563	4.131
Mean if Fail	1 287	90.7	1 378	31.9	1.189	0.665	0.491	1 126 070	50.556	2.583	1.591
Mean if Success	1 427	401	1 828	67.2	27.089	17.998	2.188	450 007	253	123	1.882
Min if Success	90.0	-0.729	90.0	3.04	0.811	0.474	0.725	13.187	3.563	0.879	1.623
Max if Success	2 500	1 323	3 823	257	128.571	85.714	3.651	900 000	1 000	563	2.141

6.2 Correlations between the dependent and independent variables

The correlation coefficients between all independent and dependent variables are presented in table 11. For these linear correlations, the dependent variables and their logarithmic transformations were both considered. The pairwise correlation coefficients between each of the dependent variables and EV/S4 and EV/EBITDA4 are relatively high. These are also statistically significant ($p<0.01$) for the most part. This result as such is somewhat surprising as it was expected based on the literature that valuation multiples would not be a good predictor of success in general, but only within a more closely matched group such as in benchmarking.

The correlation coefficients between for the different subsets of the data are shown in table 12, table 13 and table 14. A negative correlation means that lower valuation multiples (typically a sign of undervaluation or lower expected long-term returns/growth) correlate with higher success. On the other hand, a positive correlation means that higher valuation multiples (typically a sign of overvaluation or higher expected long-term returns/growth) correlate with higher success. Both correlations can be found and differences between categories exist. The initial expectation was to find negative correlations, but upon closer analysis, the positive correlations can be well justified. The picture this presents is not as clear as the general case. For the Software & Technology category, the valuation multiples EV/S3-4 and EV/EBITDA3-4 are significant while for Restaurants category only the valuation multiple EV/EBITDA4 is significant to any degree. For the Lifestyle category, only the valuation multiples EV/S4 is significant. It should be noted that the number of observations for these calculations is not always the same as the whole subset since it is not possible to calculate all the possible valuation multiples for all campaigns due to insufficient data.

Table 11. Correlations between the dependent and independent variables.

	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-0.139	-0.133	-0.082	-0.110	-0.194	-0.126	-0.285	-0.224
EV/S2	0.011	0.043	-0.042	0.006	0.079	0.101	0.029	0.083
EV/S3	0.025	0.053	-0.021	0.021	0.083	0.104	0.047	0.095
EV/S4	0.647 ***	0.570 ***	0.273	0.570 ***	0.427 ***	0.386 **	0.477 ***	0.486 ***
EV/EBITDA1	0.291	0.278	0.088	0.054	0.183	0.195	0.153	0.123
EV/EBITDA2	0.352 **	0.322 **	0.158	0.090	0.198 *	0.191 *	0.232	0.163
EV/EBITDA3	0.007	0.053	0.010	0.006	0.087	0.115	0.063	0.103
EV/EBITDA4	0.470 ***	0.509 ***	0.784 ***	0.433 ***	0.369 **	0.386 **	0.574 ***	0.461 ***

Note: * p < 0.1; ** p < 0.05; *** p < 0.01

Table 12. Correlations between the dependent and independent variables of the Software & Technology category campaigns.

	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-0.315	-0.263	-0.101	-0.174	-0.219	-0.124	-0.356	-0.263
EV/S2	0.342	0.335	-0.028	0.258	0.230	0.206	0.183	0.239
EV/S3	0.421 *	0.261	0.266	0.484 **	0.217	0.151	0.381 *	0.375 *
EV/S4	0.633 ***	0.459 *	0.426 *	0.514 **	0.382	0.303	0.574 **	0.522 **
EV/EBITDA1	-0.452	-0.371	-0.202	-0.310	-0.151	-0.061	-0.465	-0.277
EV/EBITDA2	0.302	0.414 *	0.171	0.946 ***	0.201	0.235	0.323	0.427 *
EV/EBITDA3	0.526 **	0.534 **	0.766 ***	0.419 *	0.304	0.311	0.609 ***	0.427 *
EV/EBITDA4	0.505 **	0.632 ***	0.956 ***	0.367	0.334	0.358	0.703 ***	0.435 *

Note: * p < 0.1; ** p < 0.05; *** p < 0.01

Table 13. Correlations between the dependent and independent variables of the Restaurant category campaigns

	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	0.037	-0.064	-0.148	-0.420	0.313	0.220	-0.226	0.109
EV/S2	0.082	0.004	-0.060	-0.297	0.456	0.418	-0.120	0.282
EV/S3	0.114	0.054	-0.051	-0.318	0.407	0.391	-0.085	0.193
EV/S4	0.332	0.348	0.100	-0.139	0.329	0.317	0.226	0.141
EV/EBITDA1	-0.341	-0.236	-0.556	-0.745	-0.565	-0.500	-0.382	-0.852
EV/EBITDA2	-0.226	-0.239	-0.241	0.247	-0.177	-0.311	-0.071	0.331
EV/EBITDA3	-0.158	-0.131	-0.289	-0.027	-0.358	-0.449	-0.078	-0.085
EV/EBITDA4	-0.600	-0.600	-0.777 *	-0.841 **	-0.671	-0.656	-0.741 *	-0.688

Note: * p < 0.1; ** p < 0.05; *** p < 0.01

Table 14. Correlations between the dependent and independent variables of the Lifestyle category campaigns

	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-0.044	0.084	-0.177	-0.093	-0.014	0.087	-0.137	-0.033
EV/S2	0.099	0.205	-0.118	-0.073	0.226	0.283	-0.008	0.142
EV/S3	0.098	0.209	-0.110	-0.067	0.225	0.284	-0.004	0.147
EV/S4	0.802 **	0.656 *	0.166	0.113	0.692 *	0.656 *	0.457	0.510
EV/EBITDA1	-0.154	-0.075	0.188	-0.071	0.171	0.162	0.378	-0.042
EV/EBITDA2	0.019	0.194	-0.157	-0.111	0.177	0.266	0.006	0.100
EV/EBITDA3	0.112	0.237	-0.064	-0.053	0.241	0.305	0.029	0.170
EV/EBITDA4	0.068	0.101	0.144	0.167	0.046	0.054	0.019	0.262

Note: * p < 0.1; ** p < 0.05; *** p < 0.01

6.3 Regression models

The use of the Ordinary Least Squares (OLS) method for the estimation of linear models depends on the regression model satisfying the assumptions presented below for linear regression to valid (Wooldridge, 2016) The problems which arise if any of these assumptions do not hold vary and depend on the assumption or assumptions broken.

A1. The linear regression model is "linear in parameters."

A2. There is a random sampling of observations.

A3. The conditional mean should be zero.

A4. There is no multi-collinearity (or perfect collinearity).

A5. Spherical errors: There is homoscedasticity and no autocorrelation

A6: Optional Assumption: Error terms should be normally distributed.

Firstly, the linear relationship between the measures of campaign success as dependent variables and the independent variables is not given as much as a hypothesis to be tested. Autocorrelation should not be a problem, but heteroscedasticity may be an issue for some of the independent variables as discussed later. This is in large part due to the highly skewed nature of the dependent (and independent) variables as discussed earlier. In general, it is assumed that all the assumptions noted above are met, but where deviation is suspected, it is discussed below.

6.3.1 Valuation Multiples

Two dimensions of crowdfunding success are considered: the number of investors and the total amount raised by itself and compared to the minimum and maximum targets. Simple linear regression models were used to predict the number of investors, the total amount raised absolutely and in relation to the minimum and maximum targets for the campaign. For the linear regression models, the dependent variables and their logarithmic transformations were considered.

$$\frac{EV}{Y} = a + bX \tag{4}$$

$$\ln\left(\frac{EV}{Y}\right) = a + bX \tag{5}$$

The linear models thus took either the form (4) or (5) above, where Y stood for either Sales1-4 or EBITDA1-4, and X stood for one of the independent variables, while a and b were the constant term or the intercept and the coefficient of the independent variable respectively.

Hypothesis H1 is addressed by using the whole dataset available and hypothesis H2 is addressed by using the three selected subsets of the data (Software & Technology, Restaurants and Lifestyle categories). The findings are summarized in table 15.

Table 15. Predictors of campaign success (regression coefficients and corresponding standard errors).

Coefficients	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-1.72E-07	-5.96E-08	-1.56E-05	-0.016	-2.48E-07	-1.60E-07	-3.34E-07 **	-2.93E-07
	(1.75E-07)	(6.34E-08)	(2.72E-05)	(0.021)	(1.87E-07)	(1.87E-07)	(1.64E-07)	(1.89E-07)
EV/S2	1.17E-03	1.62E-03	-0.689	73.73	8.57E-03	1.08E-02	2.85E-03	9.16E-03
	(1.46E-02)	(5.30E-03)	(2.27)	(1 779.5)	(1.57E-02)	(1.55E-02)	(1.43E-02)	(1.61E-02)
EV/S3	3.95E-03	3.01E-03	-5.22E-01	407.78	1.33E-02	1.67E-02	7.01E-03	1.58E-02
	(2.19E-02)	(7.93E-03)	(3.40E+00)	(2 662.0)	(2.35E-02)	(2.32E-02)	(2.13E-02)	(2.41E-02)
EV/S4	1.308 ***	0.417 ***	77.47 *	141 260.4 ***	0.815 ***	0.737 **	0.839 ***	0.996 ***
	(0.250)	(0.097)	(44.365)	(33 008.8)	(0.284)	(0.289)	(0.254)	(0.294)
EV/EBITDA1	1.25E-07	4.07E-08	6.41E-06	2.48E-03	7.66E-08	7.78E-08	5.92E-08	4.77E-08
	(8.97E-08)	(3.07E-08)	(1.59E-05)	(1.00E-02)	(9.39E-08)	(8.94E-08)	(8.34E-08)	(8.82E-08)
EV/EBITDA2	1.66E-07 **	5.37E-08 **	1.22E-05	5.66E-03	1.04E-07	9.84E-08	1.11E-07	8.74E-08
	(6.81E-08)	(2.43E-08)	(1.18E-05)	(9.71E-03)	(8.23E-08)	(8.09E-08)	(7.27E-08)	(8.45E-08)
EV/EBITDA3	1.59E-04	4.03E-04	3.60E-02	1.84E+01	2.09E-03	2.74E-03	1.43E-03	2.57E-03
	(3.09E-03)	(1.08E-03)	(5.22E-01)	(4.09E+02)	(3.54E-03)	(3.50E-03)	(3.25E-03)	(3.67E-03)
EV/EBITDA4	0.282 ***	0.110 ***	66.16 ***	31 875.8 ***	0.209 **	0.219 **	0.300 ***	0.280 ***
	(0.086)	(0.030)	(8.51)	(10 758.36)	(0.087)	(0.086)	(0.070)	(0.089)

Note: Standard error in parentheses
* p < 0.1; ** p < 0.05; *** p < 0.01

Table 15 shows the Ordinary Least Squares (OLS) regressions coefficients (the b coefficient in equations (4) and (5) above) on the dependent variables and their natural logarithms. The standard errors of these coefficients are shown under the corresponding coefficient in parentheses. These correspond to the correlations described in table 11. The corresponding standardized regression coefficients are shown in table 16. The R^2 values for table 15 are equal to the square of the correlation coefficients from table 11 as they should. These show that higher valuation multiples, apart from EV/S1 (where the coefficient is negative), correspond with success and a higher amount of raised money and a higher number of investors. These coefficients are not statistically significant apart from EV/S4 and EV/EBITDA4, which are shown to predict campaign success quite well in general. This applies to the whole dataset where the valuation multiples were available.

Table 16. Standardized regression coefficients for the single variable regressions.

Coefficients	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-1.67E-07	-5.79E-08	-1.52E-05	-1.68E-02	-2.51E-07	-1.62E-07	-3.36E-07 **	-3.04E-07
EV/S2	1.16E-03	1.60E-03	-0.677	76.4	8.82E-03	1.10E-02	2.88E-03	9.60E-03
EV/S3	3.90E-03	2.96E-03	-0.513	422.4	1.37E-02	1.71E-02	7.09E-03	1.66E-02
EV/S4	1.163 ***	0.371 ***	75.90 *	130 949 ***	0.828 ***	0.739 **	0.842 ***	0.985 ***
EV/EBITDA1	9.89E-08	3.42E-08	4.61E-06	2.34E-03	6.72E-08	7.06E-08	5.10E-08	4.70E-08
EV/EBITDA2	1.68E-07 **	5.58E-08 **	1.17E-05	5.48E-03	1.02E-07	9.73E-08	1.09E-07	8.82E-08
EV/EBITDA3	1.69E-04	4.42E-04	3.50E-02	18.9	2.17E-03	2.84E-03	1.44E-03	2.69E-03
EV/EBITDA4	0.251 ***	0.098 ***	64.8 ***	29 549 ***	0.212 **	0.220 **	0.301 ***	0.277 ***

Note: Standard error in parentheses
* p < 0.1; ** p < 0.05; *** p < 0.01

It should be noted that typically high valuation multiples indicate overvaluation, and thus the first expectation was that the regression coefficients should have been negative. Another possible explanation for a high valuation multiple is that a larger part of expected earnings from the equity is expected to emerge further into the future. The reasons for the negative correlation are discussed later.

Testing for the significance of the category for predicting the campaign success three dummy variables (Software & Technology, Restaurants, and Lifestyle with Other as the baseline) were created as control variables and the regressions were re-evaluated for multiples EV/S4 and EV/EBITDA4. The fourth-year forecasts of EBITDA and Sales were selected for this comparison based on their best correlation as shown above. Reasons for why the fourth-year estimates appear to show the highest correlation while the expectation was that they have the highest level of uncertainty are discussed later. A summary of the results can be seen below in table 17 and for EV/S4 and in table 18 and for EV/EBITDA4. Generally, the category dummy variables are not significant at the 95% confidence level.

Some of the models discussed above and described in the tables below have surprisingly high R^2 values. However, the standard errors are also very high and typically only the EV/EBITDA or EV/S multiples are statistically significant. The high R^2 values should, therefore, be interpreted as a sign of skewed distributions or outliers. The possible outliers are theoretically difficult to identify as the EV/EBITDA or EV/S forecast multiples may get rather high or low values depending on e.g. how the valuation and the forecasts account for the uncertainty and how far into the future the bulk of the expected earnings are. Low valuation (high risk) with high (but uncertain) EBITDA and Sales forecasts give very low valuation multiples, whereas high valuation with low EBITDA and Sales forecasts (high expected profits even further in the future) results in very high valuation multiples. This applies even more so to EBITDA as companies experiencing rapid growth may have very low or even negative EBITDA even if the scale of operations (Sales) is already quite high. This is typical of Software & Technology category, where initial investments may be considerable, but scaling up the business is relatively cheap.

Table 17. Predictors of project success with category dummy variables for EV/S4.

% of min raised	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	1.309	0.456	0.007	0.384	2.235
Software & Technology	-0.823	0.557	0.149	-1.954	0.308
Lifestyle	-2.021	0.691	0.006	-3.424	-0.617
Restaurants	-1.421	0.773	0.075	-2.990	0.148
EV/S4	1.370	0.236	1.42E-06	0.890	1.849

Regression Statistics	
Multiple R	0.736
R Square	0.542
Adjusted R Square	0.489
Standard Error	1.450
Observations	40

% of max raised	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	0.536	0.180	5.22E-03	0.17	0.90
Software & Technology	-0.307	0.220	0.172	-0.75	0.14
Lifestyle	-0.709	0.273	1.36E-02	-1.26	-0.16
Restaurants	-0.611	0.305	0.053	-1.23	0.01
EV/S4	0.440	0.093	3.72E-05	0.25	0.63

Regression Statistics	
Multiple R	0.673
R Square	0.454
Adjusted R Square	0.391
Standard Error	0.572
Observations	40

Investors	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	28.018	89.960	0.757	-154.61	210.65
Software & Technology	69.807	110.002	0.530	-153.51	293.12
Lifestyle	-30.571	136.457	0.824	-307.59	246.45
Restaurants	-24.110	152.572	0.875	-333.85	285.63
EV/S4	85.923	46.615	0.074	-8.71	180.56

Regression Statistics	
Multiple R	0.310
R Square	0.096
Adjusted R Square	-0.007
Standard Error	286
Observations	40

Total raised	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	43 617	66 394	0.516	-91 170	178 404
Software & Technology	18 359	81 186	0.822	-146 458	183 175
Lifestyle	-41 416	100 711	0.683	-245 870	163 038
Restaurants	-104 776	112 605	0.359	-333 375	123 824
EV/S4	147 962	34 404	1.30E-04	78 119	217 806

Regression Statistics	
Multiple R	0.593
R Square	0.352
Adjusted R Square	0.278
Standard Error	211 203
Observations	40

ln(% of min raised)	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	-0.942	0.567	0.1059	-2.09	0.21
Software & Technology	-0.537	0.693	0.4437	-1.95	0.87
Lifestyle	-1.255	0.905	0.1745	-3.09	0.58
Restaurants	-0.295	0.961	0.7609	-2.25	1.66
EV/S4	0.837	0.295	0.0075	0.24	1.44

Regression Statistics	
Multiple R	0.477
R Square	0.228
Adjusted R Square	0.137
Standard Error	1.803
Observations	39

ln(% of max raised)	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	-1.855	0.590	0.0034	-3.05	-0.66
Software & Technology	-0.649	0.714	0.3699	-2.10	0.80
Lifestyle	-0.630	0.936	0.5052	-2.53	1.27
Restaurants	-0.511	1.008	0.6154	-2.56	1.54
EV/S4	0.213	0.092	0.0258	0.03	0.40

Regression Statistics	
Multiple R	0.415
R Square	0.172
Adjusted R Square	0.075
Standard Error	1.864
Observations	39

ln(Investors)	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	2.696	0.515	8.61E-06	1.65	3.74
Software & Technology	-0.286	0.630	0.6531	-1.57	0.99
Lifestyle	-0.086	0.823	0.9178	-1.76	1.59
Restaurants	0.483	0.874	0.5838	-1.29	2.26
EV/S4	0.803	0.268	5.04E-03	0.26	1.35

Regression Statistics	
Multiple R	0.497
R Square	0.247
Adjusted R Square	0.158
Standard Error	1.639
Observations	39

ln(Total raised)	Coefficients	Standard Error	P-value	Lower 95%	Upper 95%
Intercept	9.789	0.601	1.25E-17	8.57	11.01
Software & Technology	-0.249	0.734	0.7371	-1.74	1.24
Lifestyle	-0.500	0.959	0.6058	-2.45	1.45
Restaurants	0.176	1.019	0.8642	-1.89	2.25
EV/S4	0.993	0.312	3.12E-03	0.36	1.63

Regression Statistics	
Multiple R	0.496
R Square	0.247
Adjusted R Square	0.158
Standard Error	1.911
Observations	39

Table 18. Predictors of project success with category dummy variables for EV/EBITDA4.

% of min raised	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	1.595	0.560	0.0073	0.46	2.73	Multiple R	0.563
Software & Technology	-1.015	0.678	0.1435	-2.39	0.36	R Square	0.317
Lifestyle	-1.454	0.846	0.0945	-3.17	0.26	Adjusted R Square	0.239
Restaurants	-1.725	0.957	0.0801	-3.67	0.22	Standard Error	1.770
EV/EBITDA4	0.289	0.087	2.09E-03	0.11	0.47	Observations	40

% of max raised	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	0.565	0.194	0.0061	0.17	0.96	Multiple R	0.611
Software & Technology	-0.354	0.235	0.1405	-0.83	0.12	R Square	0.374
Lifestyle	-0.504	0.293	0.0936	-1.10	0.09	Adjusted R Square	0.302
Restaurants	-0.754	0.331	0.0290	-1.43	-0.08	Standard Error	0.612
EV/EBITDA4	0.116	0.030	4.53E-04	0.06	0.18	Observations	40

Investors	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	-95.344	53.641	0.0842	-204.24	13.55	Multiple R	0.826
Software & Technology	90.716	64.965	0.1714	-41.17	222.60	R Square	0.683
Lifestyle	56.413	81.050	0.4910	-108.13	220.95	Adjusted R Square	0.646
Restaurants	-147.274	91.704	0.1173	-333.44	38.89	Standard Error	169.6
EV/EBITDA4	71.799	8.328	3.54E-10	54.89	88.71	Observations	40

Total raised	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	62 821	72 902	0.3947	-85 178	210 819	Multiple R	0.477
Software & Technology	356	88 291	0.9968	-178 885	179 597	R Square	0.228
Lifestyle	24 066	110 152	0.8283	-199 555	247 686	Adjusted R Square	0.140
Restaurants	-146 267	124 632	0.2485	-399 282	106 749	Standard Error	230 484
EV/EBITDA4	35 649	11 318	3.34E-03	12 672	58 626	Observations	40

ln(% of min raised)	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	-0.834	0.594	0.1691	-2.04	0.37	Multiple R	0.403
Software & Technology	-0.639	0.719	0.3807	-2.10	0.82	R Square	0.163
Lifestyle	-0.825	0.943	0.3879	-2.74	1.09	Adjusted R Square	0.064
Restaurants	-0.530	1.015	0.6048	-2.59	1.53	Standard Error	1.877
EV/EBITDA4	0.202	0.092	0.0353	0.01	0.39	Observations	39

ln(% of max raised)	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	-1.855	0.590	0.0034	-3.05	-0.66	Multiple R	0.415
Software & Technology	-0.649	0.714	0.3699	-2.10	0.80	R Square	0.172
Lifestyle	-0.630	0.936	0.5052	-2.53	1.27	Adjusted R Square	0.075
Restaurants	-0.511	1.008	0.6154	-2.56	1.54	Standard Error	1.864
EV/EBITDA4	0.213	0.092	0.0258	0.03	0.40	Observations	39

ln(Investors)	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	2.525	0.481	8.15E-06	1.55	3.50	Multiple R	0.593
Software & Technology	-0.319	0.583	0.5874	-1.50	0.86	R Square	0.351
Lifestyle	0.427	0.764	0.5794	-1.12	1.98	Adjusted R Square	0.275
Restaurants	0.055	0.822	0.9467	-1.62	1.73	Standard Error	1.521
EV/EBITDA4	0.298	0.075	3.33E-04	0.15	0.45	Observations	39

ln(Total raised)	*Coefficients*	*Standard Error*	*P-value*	*Lower 95%*	*Upper 95%*	*Regression Statistics*	
Intercept	9.812	0.615	2.38E-17	8.56	11.06	Multiple R	0.468
Software & Technology	-0.345	0.745	0.6466	-1.86	1.17	R Square	0.219
Lifestyle	0.050	0.977	0.9599	-1.94	2.03	Adjusted R Square	0.127
Restaurants	-0.181	1.052	0.8645	-2.32	1.96	Standard Error	1.945
EV/EBITDA4	0.279	0.096	6.08E-03	0.09	0.47	Observations	39

When only the selected subsets for Software & Technology, Restaurants or Lifestyle categories are considered alone, the findings are summarized in table 19, table 20 and table 21 respectively. These are done for testing of hypothesis H2.

Based on the typical use of valuation multiples this type of correlation should give more accurate results, but in this case, this does not appear to be so. As noted earlier, the valuation multiples EV/S3-4 and EV/EBITDA3-4 are significant for the Software & Technology category. For the Restaurants category, only the valuation multiple EV/EBITDA4 is significant to any degree, while for the Lifestyle category, only the valuation multiples EV/S4 is significant. This may be due to the smaller sample size. For example, for the Lifestyle category, the regression for EV/S4 consists of essentially three points (or alternatively two outliers).

Table 19. Predictors of project success (regression coefficients) for Software & Technology category campaigns.

Coefficients	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Investors)	ln(Total raised)
EV/S1	-1.63E-07	-5.47E-08	-1.64E-05	-1.92E-02	-2.26E-07	-1.27E-07	-3.06E-07	-2.74E-07
	(1.10E-07)	(4.49E-08)	(3.62E-05)	(0.024)	(2.31E-07)	(2.31E-07)	(1.84E-07)	(2.30E-07)
EV/S2	0.1583	0.0634	-4.112	22 823	0.2127	0.1890	0.1379	0.2154
	(0.0996)	(0.0409)	(33.87)	(19 594)	(0.2124)	(0.2115)	(0.1742)	(0.2060)
EV/S3	0.5839 *	0.1482	117.8	128 363 **	0.6024	0.4148	0.8590 *	1.0123
	(0.2887)	(0.1258)	(98.02)	(53 263.9)	(0.6394)	(0.6411)	(0.4919)	(0.5904)
EV/S4	1.096 ***	0.3367 *	269.6 *	192 113 **	1.274	1.032	1.743 **	1.860 **
	(0.358)	(0.174)	(152.929)	(85 761.5)	(0.822)	(0.867)	(0.665)	(0.812)
EV/EBITDA1	-2.61E-07	-9.43E-08	-5.72E-05	-0.0342	-2.13E-07	-8.35E-08	-5.97E-07	-3.64E-07
	(2.30E-07)	(1.05E-07)	(1.24E-04)	(0.0470)	(6.26E-07)	(6.08E-07)	(5.08E-07)	(5.66E-07)
EV/EBITDA2	0.0134	0.0086 *	2.874	9 326 ***	0.0205	0.0237	0.0268	0.0421 *
	(0.0106)	(0.0047)	(4.1319)	(802.6)	(0.0257)	(0.0253)	(0.0203)	(0.0230)
EV/EBITDA3	0.1289 **	0.0536 **	59.94 ***	19 615 *	0.1495	0.1514	0.2434 ***	0.2043 *
	(0.0478)	(0.0195)	(11.55)	(9 764)	(0.1102)	(0.1089)	(0.0745)	(0.1017)
EV/EBITDA4	0.1322 **	0.0700 ***	91.33 ***	20 720	0.1682	0.1842	0.3223 ***	0.2342 *
	(0.0603)	(0.0229)	(7.49)	(14 044)	(0.1267)	(0.1282)	(0.0872)	(0.1294)

Note: Standard error in parentheses
* p < 0.1; ** p < 0.05; *** p < 0.01

Table 20. Predictors of project success (regression coefficients) for Restaurant category campaigns.

Coefficients	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Inves-tors)	ln(Total raised)
EV/S1	0.0228	-0.0090	-6.0655	-13 793	0.1621	0.0778	-0.1402	0.0450
	(0.3515)	(0.0811)	(23.4450)	(17 223)	(0.3064)	(0.2142)	(0.3481)	(0.2544)
EV/S2	0.0676	0.0007	-3.365	-13 408	0.4771	0.3105	-0.1036	0.2347
	(0.4121)	(0.0963)	(27.88)	(21 583)	(0.4181)	(0.3027)	(0.4299)	(0.3575)
EV/S3	0.1433	0.0157	-4.334	-21 834	0.5965	0.4057	-0.1112	0.2238
	(0.6235)	(0.1460)	(42.34)	(32 519.9)	(0.6510)	(0.4656)	(0.6549)	(0.5551)
EV/S4	0.5754	0.1331	11.80	-12 494	0.6112	0.4182	0.3696	0.2073
	(0.9426)	(0.2069)	(67.77)	(51 491)	(1.013)	(0.7218)	(0.9217)	(0.8429)
EV/EBITDA1	-0.1755	-0.0278	-19.20	-21 487	-0.1952	-0.0891	-0.2086	-0.2697
	(0.3418)	(0.0811)	(20.30)	(13 604)	(0.2852)	(0.1542)	(0.3568)	(0.1660)
EV/EBITDA2	-0.0082	-0.0020	-0.595	493	-0.0064	-0.0080	-0.0027	0.0096
	(0.0178)	(0.0041)	(1.1948)	(965)	(0.0204)	(0.0140)	(0.0190)	(0.0155)
EV/EBITDA3	-0.0823	-0.0159	-10.17	-759	-0.2038	-0.1814	-0.0425	-0.0383
	(0.2573)	(0.0602)	(16.85)	(14 234)	(0.2763)	(0.1876)	(0.2720)	(0.2340)
EV/EBITDA4	-0.5163	-0.1139	-45.54 *	-37 646 *	-0.6197	-0.4298	-0.6037	-0.5041
	(0.3973)	(0.0878)	(21.32)	(13 973)	(0.3952)	(0.2854)	(0.3156)	(0.3070)

Note: Standard error in parentheses
* p < 0.1; ** p < 0.05; *** p < 0.01

Table 21. Predictors of project success (regression coefficients) for Lifestyle category campaigns.

Coefficients	% of min raised	% of max raised	Investors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(Inves-tors)	ln(Total raised)
EV/S1	-4.12E-04	3.17E-04	-0.4833	-116	-2.35E-04	1.41E-03	-2.33E-03	-5.31E-04
	(3.30E-03)	(1.34E-03)	(0.9482)	(439)	(6.26E-03)	(6.01E-03)	(6.29E-03)	(6.06E-03)
EV/S2	2.14E-03	1.90E-03	-0.759	-467	8.70E-03	1.07E-02	-3.33E-04	6.21E-03
	(7.20E-03)	(3.03E-03)	(2.12)	(2 139)	(1.32E-02)	(1.28E-02)	(1.48E-02)	(1.53E-02)
EV/S3	3.20E-03	2.91E-03	-1.058	-647	0.0130	0.0161	-0.0002	0.0096
	(1.08E-02)	(4.53E-03)	(3.18)	(3 204.7)	(0.0198)	(0.0191)	(0.0222)	(0.0229)
EV/S4	0.5911 **	0.1966 *	19.89	28 082	0.8816	0.7739	0.5626	0.8068
	(0.1972)	(0.1012)	(52.82)	(109 948)	(0.455)	(0.4394)	(0.5407)	(0.6714)
EV/EBITDA1	-7.849E-08	-1.258E-08	2.719E-06	-1.431E-03	1.689E-07	1.550E-07	2.639E-07	-2.285E-08
	(2.914E-07)	(9.695E-08)	(8.193E-06)	(1.168E-02)	(5.633E-07)	(5.444E-07)	(3.732E-07)	(3.167E-07)
EV/EBITDA2	4.960E-05	1.933E-04	-0.0599	-87.42	8.434E-04	1.200E-03	2.616E-05	5.099E-04
	(9.831E-04)	(3.691E-04)	(0.1421)	(296.1)	(1.770E-03)	(1.640E-03)	(1.612E-03)	(1.927E-03)
EV/EBITDA3	5.567E-04	5.020E-04	-0.0932	-78.15	2.120E-03	2.632E-03	2.762E-04	1.705E-03
	(1.641E-03)	(6.864E-04)	(0.4865)	(488.7)	(3.004E-03)	(2.889E-03)	(3.386E-03)	(3.472E-03)
EV/EBITDA4	0.0478	0.0288	16.41	39 399	0.0555	0.0597	0.0217	0.3910
	(0.3143)	(0.1274)	(50.62)	(104 213)	(0.6004)	(0.5554)	(0.5805)	(0.7195)

Note: Standard error in parentheses
* p < 0.1; ** p < 0.05; *** p < 0.01

6.3.2 Basis of Valuation

For this part of the present study, a series of telephone interviews was conducted. This series of interviews consisted of 25 and 6 campaigns for Software & Technology and Restaurants categories respectively. The quantitative results from these interviews are discussed below and the qualitative part of the findings are discussed later in section 6.4.3.

The individual interview results are shown graphically in figure 10 and figure 11 for the Software & Technology and the Restaurant categories respectively. Each interview result is represented with a single bar in these bar charts. The four categories were: an in-depth analysis of expected profits (team, markets, concept, scalability, stage, investment terms), project sunk/estimated cost, benchmarking against other comparable companies & general experience of the market, and other.

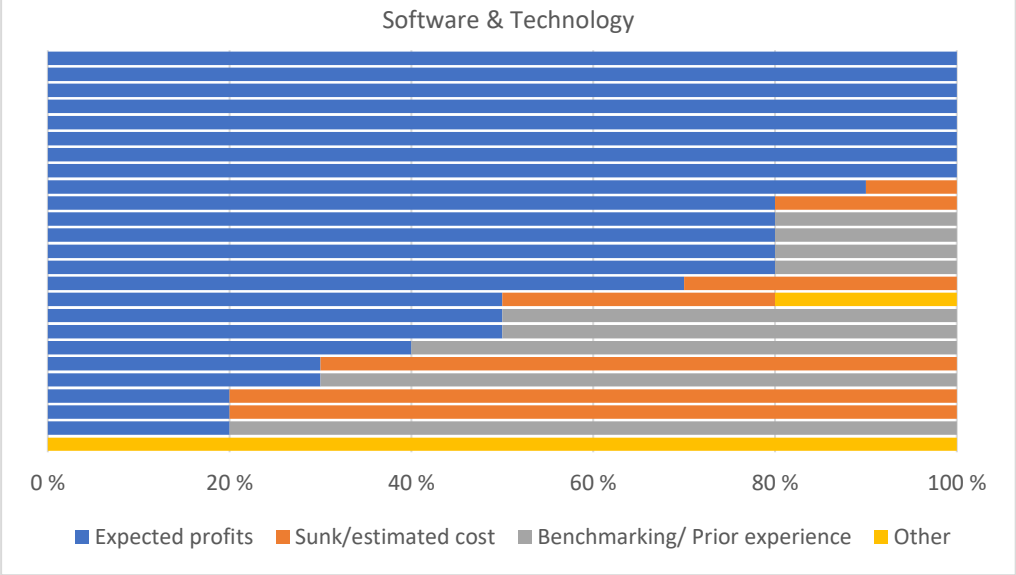

Figure 10. The interview results of the Software & Technology category

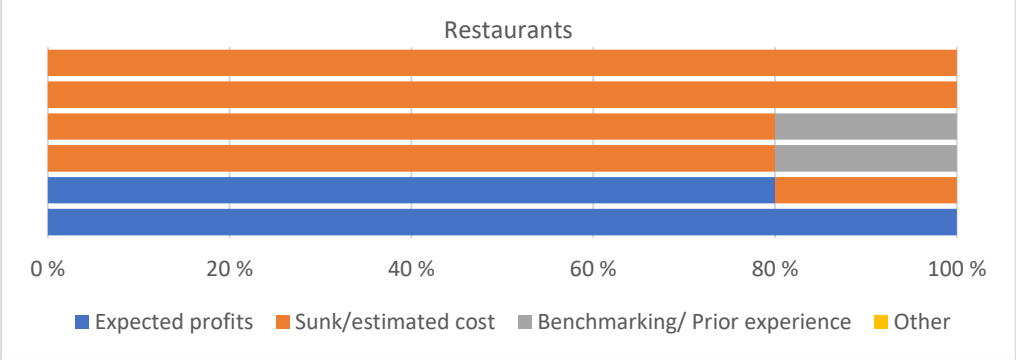

Figure 11. The interview results of the Restaurants category

A summary of the results of the basis of valuation series of telephone interviews is shown in table 22 and in the box-and-whisker plot in figure 12. The individual answers are combined into a distribution and divided into quartiles. The box denotes the interquartile range (IQR = Q_3-Q_1) and the median and the whiskers extend from the box to the largest or smallest data element less than or equal to 1.5 times the IQR. The mean (X) and possible outliers (o) are also highlighted.

Table 22. Summary of the bases of valuation series of telephone interviews

Software & Technology	Expected profits	Sunk/estimated cost	Benchmarking/ Prior experience	Other
Mean	66.80%	12.80%	15.60%	4.80%
St.Dev.	32.62%	25.74%	25.34%	20.23%
Median	80.00%	0.00%	0.00%	0.00%
Count	25			
Restaurants	**Expected profits**	**Sunk/estimated cost**	**Benchmarking/ Prior experience**	**Other**
Mean	30.00%	63.33%	6.67%	0.00%
St.Dev.	46.90%	42.74%	10.33%	0.00%
Median	0.00%	80.00%	0.00%	0.00%
Count	6			

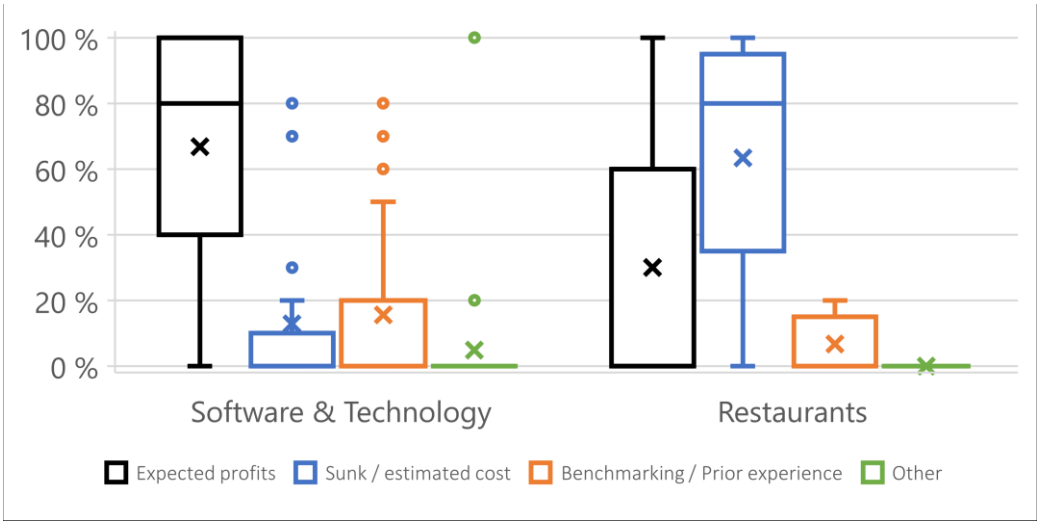

Figure 12. Box-and-whisker plot on the basis of valuation.

Based on the results shown in table 22 and in figure 12, it seems that the two selected categories differ in how the pre-money valuations of the companies having the crowdfunding campaigns are reached. This result is confirmed by applying Hotelling's T^2 -test, where the "Other" is handled as a dependent variable (see table 23 below). There the null hypothesis, that the two samples are from populations with the same multivariate mean, can be rejected at $\alpha = 0.05$ and the alternate hypothesis, that

the two samples are from populations with different multivariate means, can be upheld.

Table 23. Hotelling T-square Test: Two-samples (equal covariance matrices)

Parameter	Value
T^2	14.439
df1	3
df2	27
F	4.481
p-value	0.011

Hotelling's T^2 -test is based on three assumptions: that the samples have underlying normal distributions, that they are independent, and that they have equal variance-covariance matrices. Here the requirement of independently sampled objects may pose a problem as interdependence i.e. redundancy reduces the power of the test. The small size of the Restaurant category sample may pose a problem as well for, if the sample sizes are too small, then the normal distribution may no longer be a suitable model. As the sample size decreases, the effect is seen first at the wings of the distribution (which are the most relevant for statistical tests). It is also clear that there is a range of answers for each category and that they are quite skewed for some of the categories.

6.4 Discussion

The results presented earlier are discussed in the section below. First, the valuation multiples results are discussed and next the results pertaining to the basis of valuation. Last, a section discussing the qualitative issues related to the interviews on the basis of valuation and how they reflect on the quantitative results.

6.4.1 Discussion on the Valuation Multiples

Based on the typical use of valuation multiples described in the literature part of this study, it is somewhat surprising that hypothesis 1 (H1) can be upheld and that the forecast values of EV/EBITDA and EV/Sales valuation multiples, namely EV/EBITDA4 and EV/Sales4, can be used as general predictors of campaign success. At the same time, it should be noted, that the valuation multiples are not very good predictors of campaign success as indicated by the low values of the coefficients of determination

or R^2. The proportion of the variance in the variables indicating campaign success that are predictable from the valuation multiples are low (typically in the range between 0.2 and 0.4 in the best cases i.e. with EV/S4 and EV/EBITDA4).

Equally surprising is that controlling for the industry category of the crowdfunding campaign i.e. hypothesis 2 (H2) does not really give much added value to the predictive power of the valuation multiples. Similarly, if the linear regression is performed only for the subsets, only in the Software & Technology category were the correlations significant for the 3 and 4-year forecast values of the valuation multiples.

The fact that the correlations are clearest for the valuation multiples using the EBITDA and Sales forecasts for year 4 i.e. the ones furthest into the future is surprising as the forecasts nearest to the campaign should be expected to be the most accurate. But on the other hand, the forecasts furthest into the future should be the most representative of the company in the long term in the case of growth companies such these. The forecasts nearer to the campaigns contain too much noise from different growth rates the companies in question are experiencing.

One of the main issues with forecast valuation multiples is the fact that the forecast values of EBITDA and Sales are representative of the actual long-term stable EBITDA and Sales values to varying degree depending on the maturity of the firm. This results in highly skewed samples even in fairly small and narrowly defined subsets, and when the whole dataset is used it is very skewed indeed. This makes the regression heavily dependent on the few values of the dependent variables at higher values of the valuation multiples as well as the broadness of the distribution of the dependent variables at the lower end of the valuation multiples closer to zero. It would be tempting to disregard some of these as outliers, but there is no actual theoretical or other reason to consider these as outliers and therefore this cannot be done.

In general, the distinction between successful and unsuccessful campaigns is not always very clear, but if the dataset is taken as representative, then it is theoretically possible to draw a threshold value for the valuation multiples over which half (or other desired value) of the campaigns reach the desired target in the number of investors, total investment, or the percentage of minimum or maximum target. However, the

error corresponding to such a value would be large enough to make this value more or less meaningless and one of the main findings of this study is that the valuation multiples in question are not exactly suitable alone to use for the intended purpose as predictors of campaign success i.e. for picking potentially high-quality equity crowdfunding campaigns or for valuation of said campaigns (and not generating suitable EBITDA or Sales forecasts) in order to ensure high possibility of campaign success. Using the multiples in the traditional way of finding closely matching characteristics and basing the valuation on multiples derived from those may be a more preferable course of action. This presents a different problem in the equity crowdfunding context as the number of prior valuations in a given field may be very limited. Thus, finding a close match from prior equity crowdfunding campaigns may be impossible and matching valuations are only available from other fields of early-stage financing (and thus not entirely comparable either).

How reliable are these results? One of the possible issues could be with heteroscedasticity in the data. The results of the Breusch Pagan test show that this should not be the case for any of the correlations apart from the percentage of minimum and maximum raised as well as the number of investors for the valuation multiplier EV/EBITDA4. The Lagrange multipliers are shown in table 24 with only the above-mentioned Lagrange multipliers above the critical value at p=5% of 3.84.

Table 24. Lagrange multipliers for the Breusch Pagan test.

LM	% of min raised	% of max raised	Inves-tors	Total raised	ln(% of min raised)	ln(% of max raised)	ln(In-vestors)	ln(Total raised)
EV/S4	3.17	1.81	0.63	1.70	1.56	0.20	1.25	1.95
EV/EBITDA4	11.85	5.35	28.77	1.50	1.20	1.56	0.81	0.64

The number of dependent variables considered was quite high. 4 dependent variables and their natural logarithms bringing the total to 8. Not all of them were as informative as others, but all of them were relevant enough to warrant their inclusion in the analysis. The number of independent variables, on the other hand, in any of the models considered was only one and the number of control variables was also low. Improving and increasing the number of control variables from models used elsewhere (e.g. Lukkarinen et al., 2016) could yield relevant and interesting results. The question which should be posed before working on improving the models is for whom these models are meant. If they are for the investors for improving their investment decisions, then the emphasis is

different than if the target audience is the entrepreneurs and their valuation decision. The main focus of the present study has been to study the usefulness of the valuation multiples alone in general or within a smaller subset in predicting campaign outcomes. Thus, the aim has been to study the applicability of a very simple model and therefore constructing more elaborate models would be counter to the aim of the present study.

How should these results be interpreted? The qualitative results of this present study appear to be more relevant. For the company seeking funding higher valuation multiples signify a higher chance of a successful crowdfunding campaign. This means either higher enterprise value (EV) or a lower forecast of EBITDA or Sales. This seems counterintuitive as typically high valuation multiples are a sign of overvalued company stock. One possible explanation for the result is that investors favour companies with lower and thus less unrealistic EBITDA and Sales forecasts. The other, and equally plausible, explanation is that investors favour companies where a larger part of the company valuation arises from cash flows further into the future. This would also result in higher values for the valuation multiples.

But since the enterprise value of the company depends on the value of the forecast cash flows, the significance of the valuation multiples is in describing how far into the future these cash flows lie and how large is the risk related with them. So, companies with higher associated risk have lower enterprise value and are therefore less attractive for investment. The companies seeking funding should concentrate on mitigating these risks, to increase their chances of success and investors should look for lower risk investments (with other things being equal).

In conclusion, it appears that investors favour either campaigns with more realistic growth expectations i.e. lower EBITDA and Sales forecasts and/or campaigns with higher long-term growth potential. Both of these would result in a higher present or near-term valuation multiples. These findings are not to be seen as contradictory, but consistent with each other as realistic long-term growth potential can be seen as ultimately highly desirable.

Invesdor, as an equity crowdfunding portal, has acknowledged (Herrala, 2018b) the difficulties in early-stage valuation and the growth forecasts on which they are based (Rajala and Herrala, 2018). They have

therefore specifically stated that valuations based purely on forecasts are not accepted by the platform as such. Instead, they should always be backed up with evidence from valuations of comparable companies and their valuation multiples (Herrala, 2018b). However, it is not clear when this policy has been adopted, but the assumption is that it has not been in use during the period described in this study.

6.4.2 Discussion on the Basis of Valuation

According to the results of the present study, the two crowdfunding campaign categories selected for closer examination are significantly different when it comes to how the companies form their valuations. It seems likely that the difference in these results represents clear differences in how these companies perceive investments in the companies through crowdfunding.

As a broad generalization, one explanation for the observed differences is that the companies in the Software & Technology category use the funding from crowdfunding campaigns primarily to grow and expand their businesses. The focus is quite clearly on growth through investment and this is reflected in how the companies in question form their valuations. On the other hand, it one may also assume, that the companies in the Restaurants category perceive their growth possibilities to be smaller and the focus of the entrepreneurs is not on developing and growing the company with some form of exit strategy in mind but instead look for smaller-scale investments into fixed assets or to get sufficient working capital to start operating. In the Software & Technology category, it can be assumed that the focus is more on growth and exit (through e.g. an IPO) and not so much on the dividends whereas in the Restaurants category there is no such expectation of growth and expected dividends (or a regular salary income) play a larger role. Similarly, for the entrepreneurs, it can be assumed that there is a shift in the focus from capital gains to dividends and salaried income between the Software & Technology and the Restaurants categories. It should be noted that there is no clear evidence to support these assumptions (e.g. not discussed during the interviews), but they explain well the observed differences.

Another relevant point to note is that, while the interview protocol used was similar to a commonly used one, and the main intention of the interviews was to gain as objective a view into the decision-making process as possible, the possibility cannot be overruled that the interview process influenced the results in some way, either through a preconceived notion on the interviewer's part or even through the action of posing the question. It is difficult to discern true analysis from the *ex-post* rationalization of a decision by the interviewee since this, for the most part, is done subconsciously by everyone to some degree. While this may distort the results a little, it is unlikely that this greatly affects the results seen. More broadly, it can be postulated that differences between crowdfunding campaigns lead to differences in approaches to valuation, and just as not all crowdfunding investors act in an (economically) rational neither do all entrepreneurs. Also, some seeming discrepancies in valuation could be explained through the Principal-Agent problem which exists where the interests of the entrepreneur do not match the interests of the company as a whole.

6.4.3 Discussion on the Qualitative Aspects of the Basis of Valuation Interviews

While the main focus of the telephone interviews was on collecting the data required for the quantitative part, due to the open format of the interviews, they also resulted in a body of knowledge not entirely represented by the numerical data. The following is a short overview of the interviews summarizing the most important observations where they support, or on the other hand contradict, the quantitative results discussed above.

For the campaigns in the Restaurants category, the interview data presented above is quite simple to interpret. Of the six interviews held, all but one held that the project budget played a part in the valuation of the company for the equity crowdfunding campaign. The one campaign which made their entire valuation based on the expected profits also mentioned that the expected profits were already represented in the resale value of the restaurant and the lease they had on the restaurant location. They also factored in their brand value and the experience of the team in a CV method fashion. It should be noted, that this one company

or campaign was the only one to actually indicate that the exit value of the venture had been an influence in their valuation decision.

While the other campaigns mainly based their valuation on the project costs, some also mention a direct reference to comparisons with past projects. The use of outside experts was also mentioned once. Thus, the importance of prior referenced should not be ignored either based on own past experiences or outside expertise. Other reasons apart from funding were also mentioned once, as crowdfunding campaign was also seen as a means of marketing the restaurant project both to private investors as well as the future customer base.

In the Software and Technology category, the interview results centre more on the expected profits. Many had conducted a quite thorough analysis along the lines outlined in the FiBAN valuation process (Etula, 2015). Four campaigns directly quote FiBAN as a source or influence of the valuation method. The size of the markets into which the companies planned to enter also played a major role in the growth potential and the expected profits calculations and they were mentioned by five campaigns.

The valuation of the company at this early stage is an iterative process through several funding rounds, and prior rounds or earlier discussions on valuation with private equity funders were quoted by four campaigns. Two campaigns based their expected profits mainly on the estimated value of their patents or other immaterial property rights.

Other views also existed, as one campaign quoted that the valuation was based on a short-term outlook. Reasons other than funding were also present as one campaign quoted that the campaign was held in part to test the markets for interest. Outside experts and the expert advice of Business Angels was also used in forming the valuation for the campaign.

The support Invesdor as an equity crowdfunding platform can give at this point of the process may be important and they have also recognized its importance (Mäkelä, 2018). From this perspective, it is good that they acknowledge the importance of both the financial figures and the other qualitative evidence in creating a credible basis of valuation which improves the chances of a successful campaign.

7. CONCLUSIONS

In this chapter, the final conclusions of the thesis are presented starting with a summary of the research and followed by its implications, both academic and practical. The chapter concludes with a discussion on the limitations of this work as well as possible suggestions for topics for further research.

7.1 Research summary

The aim of the present study was to establish the degree to which the valuation multiples EV/EBITDA and EV/Sales can be used to predict campaign success and their usefulness as a simplistic metric in evaluating campaign's prospects. In this, the present study has to a large extent been successful. A clear correlation between campaign success and the forecast valuation multiples EV/EBITDA4 and EV/S4 exists (i.e. valuation multiples with EBITDA or Sales predictions four years into the future from the time of the campaign). These correlations are positive correlations, which means that higher EV/EBITDA4 and EV/S4 values are associated with higher crowdfunding campaign success factors. This may seem counter-intuitive at first, as high valuation multiples are typically associated with overvaluation, but can be explained by investors preferring longer-term or lower risk investments.

While the correlations are clear, they only explain a minor part of the variation in the dependent variables. This limits the usefulness of these models in predicting campaign success as a significant part of the variation in the dependent variables is not explained by the simple models tested. Also, there is no evidence of the use of valuation multiples by the investors in this general way to select campaigns in which to invest. However, it is possible that the valuation multiples are used for benchmarking

versus a selection of other similar companies, which is more in line with the normal practice in investing but there the reference group selected most probably would not be other crowdfunding campaigns but other similar companies.

In the case of established companies, valuation multiples are used to detect overvalued or undervalued companies or to make the valuation relative to other closely matching companies. This is especially the case when actual EBITDA or Sales figures are used, but in the case of forecast values, the multiples reflect more the risk and reliability associated with these forecasts and low values are not a sign of undervaluation but signify unreliable, risky, or highly variable cash flows (EBITDA or Sales). This could signify that investors favour companies with lower and thus more realistic EBITDA and Sales forecasts (resulting in higher valuation multiples). The other, and equally plausible, explanation is that investors favour companies where a larger part of the company valuation arises from cash flows further into the future i.e. higher growth companies. This would also result in higher values for the valuation multiples. As a result, the positive correlation between the dependent variables signifying campaign success and the valuation multiples e.g. EV/EBITDA4 and EV/S4 is not as counterintuitive as it seems at first.

The other aim of this study was to establish how the companies seeking funding through equity crowdfunding form their valuation prior to the campaign. Here the findings are clear that a range of valuation approaches are used by the companies and that there are clear differences between especially the campaigns but also between the different categories of campaigns. This may reflect the different roles for which the funding is sought for.

For the presumably more purely growth companies in the Software & Technology category, the focus is more on the traditional finance approach of Discounted Cash Flow (DCF) or similar. This may be reflective of the relatively higher importance of earnings further into the future. On the other hand, companies in the Restaurants category have probably lower growth prospects as well as lower related risks. It is reasonable to assume that this puts a higher emphasis on the working capital and fixed assets instead of growth investments. This assumption could explain the observed differences between the companies within the two categories.

7.2 Academic contribution

The contribution into the academic understanding of early-stage financing in the equity crowdfunding context that the present study makes is the introduction of the forecast valuation multiples as a viable tool for estimating campaign success. The lack of earlier understanding or established theoretical foundation on the subject has led implicitly to borrowing from other related academic fields such as donations or rewards-based crowdfunding on one hand and especially on VC and BA financing on the other.

At the same time, the present study also highlighted the problems associated with the method, since with forecast values in the denominator, there is a higher-level uncertainty related to both the denominator as well as the numerator which is often at least partially based these forecasts. Nevertheless, the correlation found between the valuation multiples and campaign success seems both valid and valuable. This result should be later verified with a larger dataset as one becomes available from the same source (Invesdor) or another related platform.

Also, the present study has shed light on how companies holding crowdfunding campaigns form their valuation and the basis on which such decisions are made. Even though the sample size is not large, it is clear that differences between types of campaigns do exist and that even companies within the same field may be quite heterogeneous in this sense. This subject matter has not been explored in the literature earlier and therefore the results of the present study have clear novelty value.

7.3 Practical implications

The practical implications of the present study for the decision making of investors are not straightforward. While in general, the forecast valuation multiples are a reasonable predictor of campaign success, they are fundamentally different from ones based on actual Sales or EBITDA values and thus their usefulness heavily relies on the accuracy and reliability of these predictions. Compounding the problem is the inherent difficulty of start-up valuation. Thus, the valuation multiples e.g. EV/EBITDA4 may be useful if the EBITDA forecast is reasonable, but even then, they appear

to tell more about the risks involved and variance of the valuation than about the clear over or undervaluation of the company equity in question.

For the campaigns, the implications are even less obvious, but, since higher EV/Sales or EV/EBITDA valuation multiples indicate higher chances of success for the campaign, it seems reasonable to assume that investors prefer either lower but better reasoned and justified Sales and EBITDA forecasts or growth companies with a comparatively larger part of their future earnings further into the future. This would imply that campaigns should avoid over-inflated Sales and EBITDA forecasts and they should provide as much information and campaign material as possible to decrease the information asymmetry which exists between the entrepreneurs and the investors. This is in line with previous research e.g. Ahlers et al. (2015) and Mollick (2014).

As to the results of the differences on the basis of valuation between different crowdfunding campaign categories, it is clear that differences exist. Generally, even though there exist a number of valuation methods besides Discounted Cash Flow (DCF) method and the related methods, any valuation method based on backward or forward based expenditures is not as valid as those based on expected earnings. This should be noted by the entrepreneurs and the crowdfunding platform should steer potential crowdfunding campaigns toward this type of valuation during the preparation phase of the campaign. Also, the investors should be aware of these types of discrepancies in the valuations especially when companies seeking their very first rounds of outside financing. Due to this both clear over and undervaluations are possible occasionally. Due to the existing information asymmetry, the entrepreneurs are ones with the most complete information regarding the business potential of the company. At the same time, they may not be the best ones to assess the risks involved which may lead to overly optimistic valuations. In the equity crowdfunding setting, the platform is in the best position to challenge the valuation during the screening phase of the equity crowdfunding campaign to restrain the overly optimistic valuations and make more open the basis for the valuations made.

The usefulness of valuation multiples based on forecast values of future Sales or EBITDA is limited by the accuracy and reliability of that forecast and the difficulty of finding a suitable baseline of similar companies for

benchmarking. Even though the focus in the present study has largely been on the value of using valuation multiples to predict crowdfunding campaign success in general, the best use for them should be in assessing the accuracy of the valuation of the company in question. For this, the accuracy and reliability of these forecasts are essential as is the selection of the benchmarks especially for companies experiencing a rapid growth phase.

7.4 Limitations of the study

These results are based on a study of equity crowdfunding at the Invesdor crowdfunding platform by unaccredited investors whose financial expertise may vary greatly. The results should be valid for most similar equity crowdfunding platforms within a similar legal framework which may not be the case for all seemingly similar platforms when the terms of the equity owned are not the same.

Also, the number and type of crowdfunding campaigns used for the analysis may not be entirely representative of future campaigns within these categories and certainly not of other categories. It is quite possible that the type of campaigns accepted to the crowdfunding platform shifts over time as better understanding develops and as the financing environment develops.

It should be noted that no evidence of the use of these valuation multiples by any of the investors or entrepreneurs exists and it is highly probable that they have not been used by virtually anyone. Certainly, if anyone of them did use valuation multiples in their analysis, whether for valuation or for the investment decision, they were in the clear minority and the importance of the valuation multiples for these decisions cannot have been large. However, the information encompassed within the valuation multiples must have been used and played a much larger role in decision making. Hence the correlation, but without any expectation of causality.

Selecting only one variable such as the valuation multiple to explain campaign success, inevitably leads to omitted-variable bias just as has been observed above. Thus, in a general case omitted-variable bias is one clear limitation of the present study, but in a benchmarking situation, where this problem is negated through the selection of suitably well-

matched benchmarks and thus applying more variables, different issues arise with finding suitably matching benchmarks in sufficient numbers to complete statistical analysis.

7.5 Suggestions for further research

This present study is to the knowledge of the author the first to assess crowdfunding campaign success based on valuation multiples. Also, no research into the valuation methods used by the entrepreneurs offering equity shares in their companies through crowdfunding has been readily found. Since the results of the present study are in no way exhaustive, there is ample room for future research especially in the use of benchmarking in crowdfunding valuations. As the number of crowdfunding campaigns grows and as these companies enter subsequent rounds of financing it is possible to better evaluate the possible over or undervaluations made during the crowdfunding campaigns. Also, since the type, industry and stage of the company having the crowdfunding campaign are very relevant for the actual values of valuation multiples, further attempts should be made to better factor these into the models i.e. attempts should be made to find better proxies for these factors.

Also, as noted by Lukkarinen et al. (2016), valuation is an important dimension of start-up funding which presents its unique difficulties. As shown here, the crowdfunding campaigns are not homogenous in the approach to valuation especially as crowdfunding is used by companies on different rounds of financing. The earliest rounds of outside financing in the crowdfunding framework would be the most interesting for future research especially if connected to the research suggested above.

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